FLOOD INSURANCE STUDY

WAYNE COUNTY, OHIO

AND INCORPORATED AREAS

REVISED

AUGUST 18, 2009

COMMUNITY NAME	COMMUNITY NUMBER
APPLE CREEK, VILLAGE OF	390642
BURBANK, VILLAGE OF	390753
*CONGRESS, VILLAGE OF	390837
CRESTON, VILLAGE OF	390575
*DALTON, VILLAGE OF	390846
DOYLESTOWN, VILLAGE OF	390720
FREDERICKSBURG, VILLAGE OF	390576
*MARSHALLVILLE, VILLAGE OF	390783
*MOUNT EATON, VILLAGE OF	390807
ORRVILLE, CITY OF	390577
RITTMAN, CITY OF	390578
SHREVE, VILLAGE OF	390891
SMITHVILLE, VILLAGE OF	390629
WAYNE COUNTY (UNINCORPORATED AREAS)	390574
*WEST SALEM, VILLAGE OF	390668
WOOSTER, CITY OF	390579

* NO SPECIAL FLOOD HAZARD AREAS IDENTIFIED

Federal Emergency Management Agency

FLOOD INSURANCE STUDY NUMBER
39169CV000A

NOTICE TO
FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program (NFIP) have established repositories of flood hazard data for floodplain management and flood insurance purposes. This Flood Insurance Study (FIS) report may not contain all data available within the Community Map Repository. It is advisable to contact the Community Map Repository for any additional data.

The Federal Emergency Management Agency (FEMA) may revise and republish part or all of this FIS at any time. In addition, FEMA may revise part of this FIS report by the Letter of Map Revision (LOMR) process, which does not involve republication or redistribution of the FIS report. Therefore, users should consult with community officials and check the Community Map Repository to obtain the most current FIS report components.

Selected Flood Insurance Rate Map panels for this community contain information that was previously shown separately on the corresponding Flood Boundary and Floodway Map panels (e.g., floodways, cross sections). In addition, former flood hazard zone designations have been changed as follows:

Old Zones	New Zone
A1 through A30	AE
B	X (shaded)
C	X
V1 through V30	VE

Initial Countywide FIS Effective Date: May 17, 1989

Revised FIS Report Dates: May 3, 1993
August 18, 2009

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FLOOD INSURANCE STUDY

WAYNE COUNTY, OHIO AND INCORPORATED AREAS

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study (FIS) revises and supersedes the FIS reports, Flood Insurance Rate Maps (FIRMs) and/or Flood Boundary and Floodway Maps (FBFMs) in the geographic area of Wayne County, Ohio, including the Cities of Orrville, Rittman and Wooster; the Villages of Apple Creek, Burbank, Congress, Creston, Dalton, Doylestown, Fredericksburg, Marshallville, Mount Eaton, Shreve, Smithville and West Salem; and the Unincorporated Areas of Wayne County (hereinafter referred to collectively as Wayne County) and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study has developed flood-risk data for various areas of the community that will be used to establish actuarial flood insurance rates and to assist the community in its efforts to promote sound floodplain management. Minimum floodplain management requirements for participation in the National Flood Insurance Program (NFIP) are set forth in the Code of Federal Regulations at 44 CFR. 60.3.

Please note that the City of Rittman and the Village of Creston are geographically located in Medina and Wayne Counties. The City of Rittman and the Village of Creston are included in their entirety in this FIS report.

Please note that the Villages of Congress, Dalton, Marshallville, Mount Eaton and West Salem are non-floodprone.

In some states or communities, floodplain management criteria or regulations may exist that are more restrictive or comprehensive than the minimum Federal requirements. In such cases, the more restrictive criteria take precedence and the State (or other jurisdictional agency) will be able to explain them.

The Digital Flood Insurance Rate Map (DFIRM) and FIS Report for this countywide study have been produced in digital format. Flood hazard information was converted to meet the FEMA DFIRM database specifications and Geographic Information System (GIS) format requirements. The flood hazard information was created and is provided in a digital format so that it can be incorporated into a local GIS and be accessed more easily by the community.

1.2 Authority and Acknowledgements

The sources of authority for this FIS are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

Information on the authority and acknowledgements for the previously printed FIS and FIRMs for Wayne County is shown below.

City of Rittman — The hydrologic and hydraulic analyses for the previous Rittman Flood Insurance Study were performed by the U.S. Army Corps of Engineers (COE), Huntington District, (the Study Contractor) for the Federal Emergency Management Agency (FEMA), under Inter-Agency Agreement No. EMW-85-E-1822, Project Order No. 1. This study was completed in July 1986 (Reference 1). For the upstream study reach of Tommy Run, hydrologic and hydraulic analyses were performed by Finkbeiner, Pettis and Strout, Limited for the Federal Emergency Management Agency, under Contract No. EMW-C-0289. This study was completed in January 1982. Hydrologic data for this study reach was obtained from the U.S. Department of Agriculture, Soil Conservation Service, Engineering Division in Columbus, Ohio (Reference 24).

Wayne County — The hydrologic and hydraulic analyses for the previous study (Reference 2) were obtained from a U.S. Soil Conservation Service (SCS) report titled "Killbuck Creek Flood Hazard Study, Wayne County, Ohio" (Reference 3) and the Flood Insurance Studies for the Cities of Wooster and Rittman (References 4 and 1). Additional information was obtained from the Flood Insurance Rate Maps for the Villages of Fredericksburg, Smithville, West Salem, and Clinton (References 5-7 and 8) and the City of Orrville (Reference 9).

This map modernization study was performed by Fuller, Mossbarger, Scott and May Engineers, Inc. (FMSM) for FEMA Region V under Contract No. HSFE05-05-D0026, Task Order No. 12. This work was completed in February 2009.

The hydrologic and hydraulic analyses for revised approximate stream reaches included in this updated study were prepared by FMSM. This work was completed in June 2007.

Floodplain mapping and water surface profiles for the 1-percent annual chance flood for portions of Chippewa Creek, Little Chippewa Creek, Silver Creek, Fall Ditch, Red Run, Red Run Tributary A, Red Run Tributary B, and Steele Ditch were obtained from a SCS report titled, "Chippewa Creek Flood Hazard Study, Wayne County, Ohio" (Reference 10).

Redelineated effective detailed study areas and digitized effective approximate study areas were incorporated into this FIS. In addition to incorporating the existing Flood Insurance Study for Wayne County and Incorporated Communities, this countywide FIS included incorporation of approved Letters of Map Change (LOMCs).

The vertical datum for elevation data was shifted to North American Vertical Datum of 1988 (NAVD88). The digital floodplain data was merged into a single, updated Digital Flood Insurance Rate Map (DFIRM). The DFIRM includes 2004 orthophotography, topographic breaklines, political boundaries, road centerlines with street names, railroads with names, rivers, lakes, streams, and elevation reference marks. The basemap information was obtained from the Wayne County GIS Department.

1.3 Coordination

The purpose of an initial Consultation and Coordination Officer (CCO) meeting is to discuss the scope of the FIS. A final CCO meeting is held to review the results of the study.

For the 1988 City of Rittman FIS (Reference 1), an initial COO was held on October 11, 1984 with representatives of FEMA, the City of Rittman, the Study Contractor, and the Ohio Department of Natural Resources (ODNR). Coordination with city officials and Federal, State, and regional agencies produced a variety of information pertaining to floodplain regulations, available community maps, flood history, and other hydrologic data.

On December 9, 1987, the results of the City of Rittman FIS were reviewed and accepted at the final coordination meeting attended by representatives of the Study Contractor, FEMA, and the community.

For the 1983 Medina County FIS (Reference 24), an initial CCO meeting was held on June 12, 1979. On August 30, 1982, the results of the study were reviewed and accepted at a final coordination meeting.

On May 3, 1988, the results of the 1989 Wayne County FIS (Reference 2) were reviewed and accepted at a final coordination meeting attended by representatives of the community and FEMA.

For this countywide FIS, an initial CCO meeting was held on August 14, 2006 and attended by representatives of FEMA Region V, ODNR, Division of Water, FMSM Engineers (Study Contractor), Wayne County, Cities of Rittman and Orrville, the Villages of Creston and Shreve, and the Wayne County Emergency Management Agency. The results of the study were reviewed at the final CCO meeting held on April 8, 2008, and attended by representatives of FEMA Region V, ODNR, FMSM Engineers (Study Contractor), Wayne County, Cities of Orville, Rittman and Wooster, Villages of Dalton, Smithville and West Salem and Chippewa Township. All problems raised at that meeting have been addressed in this study.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the geographic area of Wayne County, Ohio, including the incorporated communities listed in Section 1.1.

Effective approximate studies were revised with new hydrologic and hydraulic analyses or incorporated water surface elevations from the previously published SCS Chippewa Creek Flood Hazard Study (Reference 10). This SCS study on Chippewa Creek, Little Chippewa Creek, Silver Creek, Fall Ditch, Red Run, Red Run Tributary A, Red Run Tributary B and Steele Ditch did not meet all FEMA requirements for a detailed study; it is the best available approximation of the floodplain for the referenced reaches and was used as the source of information for delineating the Zone A flood hazards. Floodplains for approximate stream reaches were delineated using 2004 topographic data.

Approximate flood hazards for the Muskingum Watershed Conservancy District (MWCD) Mohicanville Dam reservoir were mapped using unpublished 1-percent annual chance reservoir pool elevation data provided by the U.S. Army Corps of Engineers. Floodplains for the reservoir pools were delineated using 2006 topographic data.

The areas studied were selected with priority given to all known flood hazard areas and areas of projected development or proposed construction through January 1993. The flooding sources studied previously by detailed methods and redelineated for this FIS are presented in Table 1.

TABLE 1 – Flooding Sources Studied by Detailed Methods

Flooding Source	Limits of Detailed Study
Apple Creek	From mouth at Killbuck Creek to confluence with Little Apple Creek 2.
Cedar Run	From mouth at Killbuck Creek to 2,700 feet upstream of Cedar Valley Road.
Chippewa Creek	From 7.4 miles above mouth to Blough Road.
Christmas Run	From mouth at Killbuck Creek to 710 feet above Saybolt Avenue.
Clear Creek	From mouth at Killbuck Creek to Smithville-Western Road.
Killbuck Creek	From Valley Road to 400 feet upstream of Wooster corporate limits; from Flickinger-Hill Road to Sterling Road.
Landis Ditch	From mouth at River Styx to City of Rittman corporate limits.
Little Apple Creek 1	From 750 feet upstream of Portage Road to State Route 3.
Little Apple Creek 2	From confluence with Apple Creek to 4,700 feet upstream of U.S. Route 250.
Little Killbuck Creek	From mouth at Killbuck Creek to 150 feet upstream of Township Road 36.
Rathburn Run	From mouth at Little Killbuck Creek to 3,200 feet above mouth.
River Styx	From mouth at Chippewa Creek to county boundary.

TABLE 1 – Flooding Sources Studied by Detailed Methods *(continued)*

Tommy Run	From mouth at Chippewa Creek to 4,020 feet above mouth; from 18,810 feet above mouth to 21, 210 feet above mouth.
Snyders Ditch	From mouth at Christmas Run to 320 feet upstream of Branstetter Road.

This countywide FIS also incorporates the determination of letters issued by FEMA resulting in map revisions (Letter of Map Revisions (LOMR)) and map amendments (Letter of Map Amendments (LOMA)).

LOMAs incorporated for this study are summarized in the Summary of Map Amendment (SOMA) included in the Technical Support Data Notebook (TSDN) associated with this FIS update. Copies of the TSDN may be obtained from the Community Map Repository.

2.2 Community Description

Wayne County is in north-central Ohio and has a total land area of 557 square miles. Wayne County is bordered by Ashland County, Ohio, on the west; Holmes County, Ohio, on the south; Stark and Summit Counties and the City of Clinton, Ohio, on the east; and Summit and Medina Counties, Ohio, to the north. Wayne County is served by U.S. Routes 71, 30 and 250; State Routes 3, 21, 57, 83, 94, 95, 179, 226, 241, 301, 302, 539, 565, 585, and 604; the Norfolk Southern Railway, the CSX railroad, and Conrail. The 2006 census population estimate for Wayne County was 113,950, an increase of 16,542 from 1980 (Reference 11).

The City of Rittman is on the Wayne-Medina county line approximately 45 miles south of the City of Cleveland, Ohio. The northern portion of Rittman is surrounded by the unincorporated areas of Medina County, and the southern portion of Rittman is surrounded by the unincorporated areas of Wayne County. The 2005 census population estimate for City of Rittman was 6,311, an increase of 248 from 1980 (Reference 11).

The soils of the area were formed from a wide variety of parent soil materials and have a wide range of slope, texture, and drainage properties. The soils of the uplands include Canfield, Wooster, Riddles, Rittman, Wadsworth, Bennington, and Cardington series. They are formed in loamy glacial till on nearly level to steep slopes. The glacial mantle ranges in depth from a few feet to an extreme of 90 to 100 feet. Soil drainage ranges from somewhat poorly drained to well drained. Berks and Mechanicsburg soils have formed on very steep slopes of the uplands in bedrock residium. There is a wide variety of soils formed on floodplains and stream terraces. The flood-prone soils include Melvin, Euclid, and Orrville series. They are nearly level, poorly drained, deep soils formed in silty and loamy alluvium. A buried valley exists beneath both Chippewa Creek and the River Styx, which is filled with outwash sands, gravel, and slack water clays to a depth of 270 feet at Rittman. This geologic feature provides a large potential for underground water storage and reduces the flood potential of the basin. The southeast comer of the city is a swamp area, and the whole southern section of the city is dotted with salt wells. The River Styx has a broad, flat floodplain which empties all the swamp. Above the confluence of Little Chippewa Creek and Chippewa Creek is also a swamp area.

The climate of the area is characterized by wide seasonal ranges in temperature and precipitation. Mean monthly temperatures range from 27.3 degrees Fahrenheit (°F) in January to 71.6°F in July. On the average there are five days when morning temperatures fall below 0°F and twelve days when maximum temperatures exceed 90°F. The average annual precipitation is 37.0 inches, 58 percent of which falls between April and September. In Rittman, the average annual precipitation is 37.5 inches. Precipitation is greatest during May, June, and July when thunderstorms are most frequent. The mean annual snowfall is 32.9 inches, with one inch or more of snow on the ground an average of 24 days per year (Reference 12). Development within the floodplains of Killbuck and Apple Creeks around Wooster is related to the oil and gas industries. Residential development has been primarily associated with the influx of mobile homes in the Apple Creek floodplain.

2.3 Principal Flood Problems

Between 7:30 and 8:30pm on July 4, 1969, a line of thunderstorms began moving southward across the Lake Erie shoreline from Toledo to Conneaut, Ohio, with heavy rains and wind guests of 100 miles per hour. The area of atmospheric instability remained stationary over northern Ohio for almost eight hours. The storm was recognized as the most intense and widespread summer storm ever recorded in Ohio and resulted in the maximum flood along Killbuck Creek. Rainfall in excess of 4 inches over a 6,000-square-mile area in north-central Ohio resulted in a maximum discharge of 47,500 cubic feet per second (cfs) at the U.S. Geologic Survey (USGS) stream gage on Killbuck Creek. The maximum flood discharge previously recorded at this location was 28,800 cfs in 1935 (Reference 13).

As a result of the heavy rainfall near Wooster, much of the area remained paralyzed for more than 48 hours. Because of bridge damage and road washouts, virtually every road leading to the area was closed. Forty-one deaths were attributed to the storm, 21 of which occurred in Wayne and Holmes Counties. A flood damage survey was conducted by the U.S. Army Corps of Engineers along Killbuck Creek from Millersburg, Ohio, through the flooded areas of Wooster. In this area, direct damage caused by the July 1969 flood totaled $6,208,000. The flood exceeded the 500-year frequency event. In the City of Rittman, the flooding had an estimated recurrence interval of 100 years.

Severe flooding has occurred several times since the 1969 flood. On portions of Apple Creek, floods in July 1977 and September 1979 equaled or exceeded the 100-year flood elevation.

2.4 Flood Protection Measures

The City of Rittman is within the Chippewa Creek Watershed Project authorized under Public Law 83-566. The 120,320-acre project, which includes eight water-retarding reservoirs, 33 miles of channel work, and accelerated land treatment, was completed in 1980. The hydrologic and hydraulic analyses carried out for this study reflect the structural measures and land treatment effects of this project (References 14 and 15).

On June 15, 1977, a resolution was enacted by the Wayne County Commissioners to establish a floodplain review permit system to outline the procedures and criteria for the system. The resolution required that local cities and villages administer their own floodplain regulation. In 1980, the resolution was amended so that the County

Planning Office now administers floodplain regulations. In addition, other county offices cooperate with the Planning office to ensure that the construction of septic systems, buildings, ponds, and bridges complies with floodplain regulations.

3.0 ENGINEERING METHODS

For the flooding sources studied by detailed methods in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude that are expected to be equaled or exceeded once on the average during any 10-, 50-, 100- or 500-year period (recurrence interval) have been selected as having special significance for floodplain management and for flood insurance rates. These events, commonly termed the 10-, 50-, 100- and 500-year floods, have a 10-, 2-, 1- and 0.2-percent chance, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long-term, average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than one (1) year are considered. For example, the risk of having a flood that equals or exceeds the 1-percent annual chance flood in any 50-year period is approximately 40 percent (4 in 10); for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analysis

For the revised approximate studies included in this updated FIS, 1-percent annual chance discharges were calculated using regression equations presented in USGS Water Resource Investigation Report (WRIR) 03-4164 (Reference 16).

Hydrologic and hydraulic analyses for Chippewa Creek, Little Chippewa Creek, Silver Creek, Fall Ditch, Red Run, Red Run Tributary A, Red Run Tributary B and Steele Creek were described in a Flood Hazard Study report provided by Wayne County (Reference 10). Flood discharges were established by valley and structure flood routings computed through use of the SCS watershed model “Project Formulation Hydrology, TR-20” (Reference 17).

Hydrologic analyses were carried out to establish peak discharge-frequency relationships for each flooding source studied by detailed methods affecting the community.

The following section is a compilation of previously published hydrologic information from earlier FIS reports where streams were studied in detail.

Medina County

The flow rates for Tommy Run were obtained from the United States Department of Agriculture, Soil Conservation Service (SCS) watershed model “Project Formulation Hydrology, TR-20” (Reference 17).

City of Rittman

Natural discharge-frequency curves used in this study were developed on a regional basis in accordance with methods outlined in "Statistical Methods in Hydrology" and Bulletin No. 17B (References 15 and 18). A log-Pearson Type III distribution was fitted to the annual event series for surrounding gaging stations in the Muskingum River basin. The discharge-frequency curve used for Chippewa Creek and the River Styx was based on records for the gage on Chippewa Creek at Easton. The discharge-frequency curve used for Tommy Run and Landis Ditch was based on records for the gage on Little Chippewa Creek at the Village of Smithville, Ohio.

These values were consistent with the statistics of surrounding basins evaluated over a period of 60 years and were therefore considered reasonable for the Rittman vicinity.

Flow frequencies for Chippewa Creek and the River Styx are modified by flood control projects built by the Soil Conservation Service (SCS). To estimate the effects of the projects, correlation curves were drawn from natural and modified flows provided by the SCS. The correlation curves were then entered into with the natural frequency values from the COE discharge-frequency curves and the modified flows were determined.

Wayne County

Flood discharges for Apple Creek, Cedar Run, Chippewa Creek, Clear Creek, Killbuck Creek, Landis Ditch, Little Apple Creek 1, Little Apple Creek 2, Little Killbuck Creek, Rathburn Run, River Styx and Tommy Run were established by valley and structure flood routings computed using the SCS watershed computer model (Reference 17). This program uses the convex method for stream and valley flood routing. The model was calibrated using precipitation and stream discharge data from the July 1969 storm.

Peak discharge-drainage area relationships for the 10-, 2-, 1- and 0.2-percent annual chance floods for flooding sources studied in detail from the Wayne County and the City of Rittman FIS's are presented in Table 2.

TABLE 2 - Summary of Discharges for Detailed Riverine Studies

FLOODING SOURCE AND LOCATION	Drainage Area (square miles)	Peak Discharges (cubic feet per second) 10-Percent Annual Chance Event	2-Percent Annual Chance Event	1-Percent Annual Chance Event	0.2-Percent Annual Chance Event
APPLE CREEK					
about 500 feet upstream of County Route 3A	52	5,950	9,010	9,690	11,080
CEDAR RUN					
about 1,100 feet downstream of Cedar Valley Road	5.9	2,770	4,260	4,560	5,190
CLEAR CREEK					
just upstream of Township Road 192	11.1	2,050	3,100	3,320	3,750
CHIPPEWA CREEK					
about 1,450 feet downstream of State Route 57	142.0	4,620	9,600	12,450	29,200
just upstream of confluence of the River Styx	113.9	3,850	7,250	9,960	25,500
just upstream of confluence of Tommy Run	75.1	2,500	5,280	7,400	17,450
KILLBUCK CREEK					
about 1,000 feet upstream of Valley Road	246.4	7,810	12,180	12,950	14,550
LANDIS DITCH					
at mouth	3.25	590	1,250	1,640	3,020
LITTLE APPLE CREEK 1					
about 1,700 feet upstream of Portage Road	13	1,800	2,740	2,940	3,350
LITTLE APPLE CREEK 2					
just downstream of U.S. Route 250	N/A	1,470	2,190	2,330	2,630
LITTLE KILLBUCK CREEK					
about 1,500 feet upstream of State Route 302	21.1	3,100	4,720	5,060	5,720
RATHBURN RUN					
about 600 feet upstream of Township Road 35	6.4	3,010	4,590	4,910	5,560

TABLE 2 - Summary of Discharges for Detailed Riverine Studies *(continued)*

FLOODING SOURCE AND LOCATION	Drainage Area (square miles)	Peak Discharges (cubic feet per second) 10-Percent Annual Chance Event	2-Percent Annual Chance Event	1-Percent Annual Chance Event	0.2-Percent Annual Chance Event
RIVER STYX					
at mouth	28.55	2,000	4,730	6,950	14,300
just upstream of confluence of Landis Ditch	23.29	1,830	4,420	6,100	12,800
TOMMY RUN					
at mouth	7.19	1,100	2,220	2,880	5,200
Approximately 3,100 feet downstream of Medina-Wayne County line	5.13	1,420	2,191	2,348	3,226

3.2 Hydraulic Analysis

Analyses of the hydraulic characteristics of flooding from the sources studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals. Users should be aware that flood elevations shown on the Flood Insurance Rate Map (FIRM) represent rounded whole-foot elevations and may not exactly reflect the elevations shown on the Flood Profiles or in the Floodway Data table in the FIS report. Flood elevations shown on the FIRM are primarily intended for flood insurance rating purposes. For construction and/or floodplain management purposes, users are cautioned to use the flood elevation data presented in this FIS report in conjunction with the data shown on the FIRM.

For the revised approximate studies in this updated FIS, hydraulic analyses for the 1-percent annual chance flood event were performed using the U.S. Army Corps of Engineers Hydrologic Engineering Center River Analysis Software (HEC-RAS) model, version 3.1.3 (Reference 19).

Models for revised approximate study reaches contained unsurveyed cross-sections with an average spacing of approximately 2,000 feet and did not include structures, such as bridges and culverts.

Cross-section geometry model data was created using 2-foot contour topographic mapping from 2004 obtained from the Wayne County GIS Department.

Aerial photography from 2004 obtained from the Wayne County GIS Department was used to determine the Manning's roughness coefficients for the approximate hydraulic models. A representative overbank and channel Manning's roughness coefficient was selected for each revised approximate study reach. Roughness values ranged from 0.04 to 0.1 for the overbanks and 0.03 to 0.05 within the channel.

Hydrologic and hydraulic analyses for Chippewa Creek, Little Chippewa Creek, Silver Creek, Fall Ditch, Red Run, Red Run Tributary A, Red Run Tributary B and Steele Creek were described in a Flood Hazard Study report provided by Wayne County (Reference 10). The SCS

water-surface profile program, WSP-2 (step breakwater method), was used to determine water-surface elevations for the range of discharges utilizing roughness coefficients and surveyed cross sections (Reference 20). Channel roughness factors (Manning's "n") used in the hydraulic computations were chosen by engineering judgement and based on field observations of the streams and floodplain areas. Future land use conditions were estimated by the local sponsors considering developmental changes.

Detail-studied streams that were not re-studied as part of this map update may include a "profile base line" on the maps. This "profile base line" provides a link to the flood profiles included in the Flood Insurance Study report. The detail-studied stream centerline may have been digitized or redelineated as part of this revision. The "profile base lines" for these streams were based on the best available data at the time of their study and are depicted as they were on the previous FIRMs. In some cases where improved topographic data was used to redelineate floodplain boundaries, the "profile base line" may deviate significantly from the channel centerline or may be outside the Special Flood Hazard Area (SFHA).

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles (Exhibit 1). For stream segments for which a floodway is computed (Section 4.2), selected cross section locations are also shown on the Digital Flood Insurance Rate Maps (Exhibit 2).

Cross sections for Chippewa Creek and Tommy Run were obtained from the SCS. The overbank portions of the cross sections for the River Styx and Landis Ditch were obtained primarily from topographic maps (Reference 21) based on aerial photography and a field survey of control points. Stream channel sections were based on field soundings and field survey of bridge structures. Cross sections for other detailed reaches were obtained by field survey.

In the previous Wayne County FIS, all cross sections were obtained by field survey.

Roughness coefficients (Manning's "n") for the streams previously studied in detail were chosen based upon field observation and engineering judgment. The channel and overbank "n" values for streams studied by detailed methods are listed in Table 3.

TABLE 3 - Manning's "n" Values

STREAM NAME	MANNING'S "n"	
	Channel	Overbanks
Apple Creek	0.030 - 0.042	0.050 - 0.110
Cedar Run	0.035 - 0.047	0.060 - 0.090
Chippewa Creek	0.031 - 0.033	0.045-0.055
Clear Creek	0.032 - 0.045	0.060 - 0.100
Killbuck Creek	0.031 - 0.051	0.060 - 0.130
Landis Ditch	0.032 - 0.038	0.045 - 0.080
Little Apple Creek 1	0.034 - 0.046	0.060 - 0.100
Little Apple Creek 2	0.030 - 0.042	0.050 - 0.110
Little Killbuck Creek	0.035 - 0.043	0.080 - 0.095
Rathburn Run	0.030 - 0.044	0.065 - 0.090
River Styx	0.031 - 0.033	0.040 - 0.055
Tommy Run	0.032 - 0.037	0.030 - 0.120

The coefficients of contraction and expansion used were 0.10 and 0.30, respectively, for the majority of the stream reaches. Higher values of 0.30 and 0.50 were used around bridge structures that constricted flow significantly as compared to the natural channel.

Flood frequency profiles for Chippewa Creek, Tommy Run, River Styx and Landis Ditch were computed using the HEC-2 water-surface profiles computer program (Reference 22). Chippewa Creek profiles were started at the Easton gage based on USGS rating curve no. 23. Starting elevations on all other streams were based on normal depth as computed by the slope-area method.

For all other detailed study streams, water-surface elevations of floods of the selected recurrence intervals were computed using the SCS WSP-2 step-backwater computer program (Reference 20). Computed profiles were compared to high-water marks and found to agree closely. The floodway width was computed using the SCS TR-64 computer program (Reference 23).

Flood profiles were drawn showing the computed water-surface elevations for floods of the selected recurrence intervals. In cases where the 2- and 1-percent annual-chance flood elevations are close together, due to limitations of the profile scale, only the 1-percent annual-chance profile has been shown.

The hydraulic analyses for this study are based only on unobstructed flow. The flood elevations shown on the profiles are considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

3.3 Vertical Datum

All FIS Reports and FIRMs are referenced to a specific vertical datum. The vertical datum provides a starting point against which flood, ground, and structure elevations can be referenced and compared. Until recently, the standard

vertical datum in use for newly created or revised FIS reports and FIRMs was the National Geodetic Vertical Datum of 1929 (NGVD29). With the finalization of the North American Vertical Datum of 1988 (NAVD88), many FIS reports and FIRMs are being prepared using NAVD88 as the referenced vertical datum.

All flood elevations shown in this FIS report and on the FIRM are referenced to NAVD88. Effective information for this FIS report was converted from NGVD29 to NAVD88 using a countywide average conversion of -0.7 feet (NAVD88 = NGVD29 – 0.7). Structure and ground elevations in the community must, therefore, be referenced to NAVD88. It is important to note that adjacent counties may be referenced to NGVD29. This may result in differences in Base Flood Elevations (BFEs) across the corporate limits between the communities.

For more information on NAVD88, see the FEMA publication entitled *Converting the National Flood Insurance Program to the North American Vertical Datum of 1988* (FEMA, June 1992), or contact the Vertical Network Branch, National Geodetic Survey, Coast and Geodetic Survey, National Oceanic and Atmospheric Administration, Rockville, Maryland 20910 (Internet address http://www.ngs.noaa.gov).

Temporary vertical monuments are often established during the preparation of a flood hazard analysis for the purpose of establishing local vertical control. Although these monuments are not shown on the FIRM, they may be found in the Technical Support Data Notebook associated with the FIS report and FIRM for this community. Interested individuals may contact FEMA to access these data.

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

The NFIP encourages the State and local governments to adopt sound floodplain management programs. Therefore, each FIS provides 1-percent annual chance flood elevations and delineations of the 1- and 0.2-percent annual chance floodplain boundaries and 1-percent annual chance floodway to assist communities in developing floodplain management measures. This information is presented on the FIRM and in many components of the FIS report, including Flood Profiles, Floodway Data Tables, and Summary of Stillwater Elevations Table. Users should reference the data presented in the FIS report as well as additional information that may be available at the local map repository before making flood elevation and/or floodplain boundary determinations.

4.1 Floodplain Boundaries

In order to provide a national standard without regional discrimination, the 1- percent annual chance flood has been adopted by FEMA as the base for floodplain management purposes. The 0.2-percent annual chance flood is employed to indicate additional areas of flood risk in the community. For each stream studied by detailed methods, the 1- and 0.2-percent annual chance floodplain boundaries have been delineated using the flood elevations determined at each cross section. Between cross sections, the boundaries were interpolated using digital basemap information provided by the Wayne County GIS Department. This basemap data included 2004 orthophotography and contours at two-foot intervals referenced to the Ohio State Plane coordinate system, NAD83 horizontal datum and NAVD88 vertical datum.

The 1- and 0.2-percent annual chance floodplain boundaries are shown on the DFIRM (Exhibit 2). On this map, the 1-percent annual chance floodplain boundary corresponds to the boundary of the areas of special flood hazards (Zones A and AE); and the 0.2-percent annual chance

floodplain boundary corresponds to the boundary of the areas of moderate flood hazards (Zone X). In cases where the 1- and 0.2-percent annual chance floodplain boundaries are close together, only the 1-percent annual chance floodplain boundary has been shown.

Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of topographic data.

For the streams studied by approximate methods, only the 1-percent annual chance floodplain boundary is shown on the DFIRM (Exhibit 2). Approximate 1- percent annual chance floodplain boundaries were delineated using digital basemap information described above. Approximate flood boundaries in some portions of the study area were digitized from the previous Flood Hazard Boundary Maps.

4.2 Floodways

Encroachment on floodplains, such as structures and fill, reduces flood-carrying capacity, increases flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of floodplain management involves balancing the economic gain from floodplain development against the resulting increase in flood hazard. For purposes of the NFIP, a floodway is used as a tool to assist local communities in this aspect of floodplain management. Under this concept, the area of the 1-percent annual chance floodplain is divided into a floodway and a floodway fringe. The floodway is the channel of a stream, plus any adjacent floodplain areas, that must be kept free of encroachment so that the 1-percent annual chance flood can be carried without substantial increases in flood heights. Minimum standards of FEMA and Ohio limit such increases in flood heights to 1.0 foot, provided that hazardous velocities are not produced. The floodways in this study are presented to local agencies as minimum standards that can be adopted directly or that can be used as a basis for additional floodway studies.

The floodways presented in this FIS report and on the DFIRM were computed for certain stream segments on the basis of equal conveyance reduction from each side of the floodplain. In those areas where problems arose with the equal conveyance reduction encroachment option of the HEC-2 or HEC-RAS backwater programs, modifications were applied based on experience. Floodway widths were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. The results of the floodway computations have been tabulated for selected cross sections (Table 4). In cases where the floodway and 1-percent annual chance floodplain boundaries are either close together or collinear, only the floodway boundary has been shown.

Along streams where floodways have not been computed, the community must ensure that the cumulative effect of development in the floodplain will not cause more than a 1.0-foot increase in the base flood elevations at any point within the community.

The area between the floodway and the 1-percent annual chance floodplain boundaries is termed the floodway fringe. The floodway fringe encompasses the portion of the floodplain that could be completely obstructed without increasing the water surface elevation of the 1-percent annual chance flood more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in Figure 1 on the next page.

In the redelineation efforts, the floodway was not recalculated. As a result, there were areas where the previous floodway did not fit within the boundaries of the 1-percent annual chance floodplain. Therefore, in these areas, the floodway was reduced. Table 4, Floodway Data Table lists the water surface elevations, with and without floodway, the mean velocity in the floodway, and the location and area at each surveyed cross section as determined by hydraulic methods. The width of the floodway depicted by the FIRM panels and the amount of reduction to fit the floodway inside the 1-percent annual chance floodplain, if necessary is also listed.

The floodways in this report are recommended to local agencies as minimum standards that can be adopted or used as a basis for additional studies.

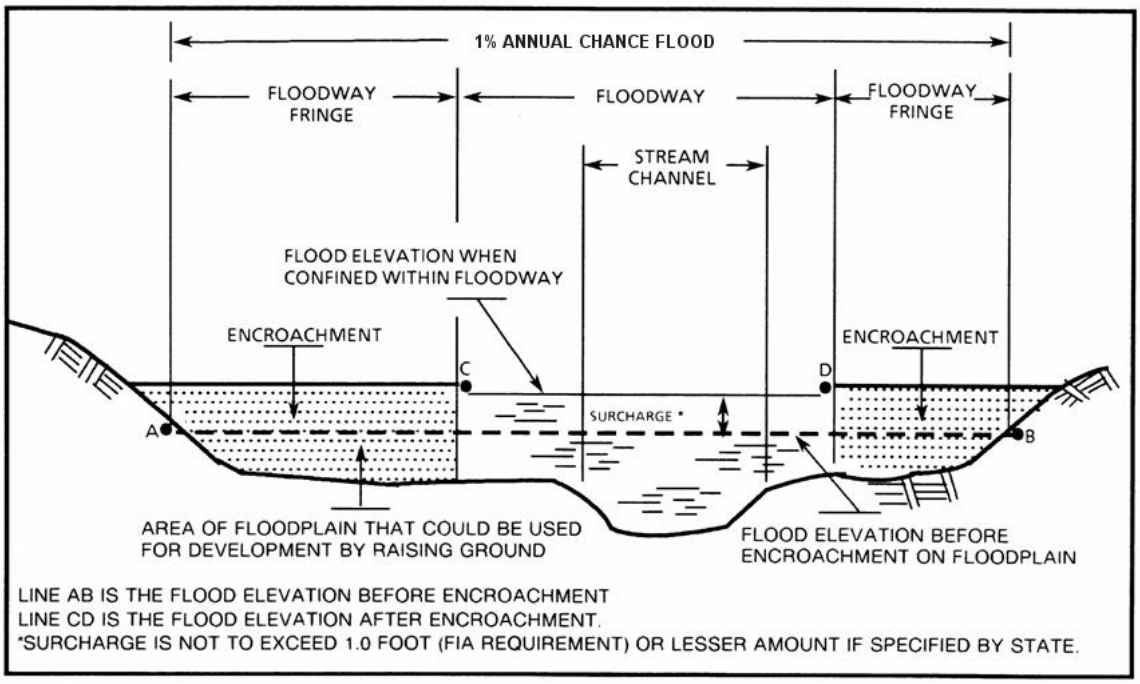


Figure 1 - Floodway Schematic

FLOODING SOURCE		FLOODWAY				1-PERCENT ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE [1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WIDTH REDUCED FROM PRIOR STUDY[2] (FEET)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Apple Creek									
A	4,050	770	6,320	1.5		864.0	864.0	865.0	1.0
B	5,275	220	1,982	4.9		865.7	865.7	866.7	1.0
C	5,775	709	6,083	1.6		867.3	867.3	868.3	1.0
D	7,750	230	2,004	4.8		870.8	870.8	871.8	1.0
E	9,450	127	1,295	7.6		875.4	875.4	876.4	1.0
F	11,550	498	4,389	2.2		885.6	885.6	886.6	1.0
G	13,650	238	1,814	5.4		888.0	888.0	889.0	1.0
H	14,500	80	749	9.5		891.5	891.5	892.5	1.0
I	16,350	265	1,100	6.5		900.4	900.4	901.4	1.0
J	18,550	122	893	8.0		910.3	910.3	911.3	1.0
K	19,800	138	1,419	5.0		916.2	916.2	917.2	1.0
L	20,700	168	1,299	4.9		917.6	917.6	918.6	1.0
M	28,975	80	687	8.7		952.2	952.2	953.2	1.0
N	33,450	222	1,233	4.9		969.7	969.7	970.7	1.0
O	34,200	166	1,475	4.1		973.8	973.8	974.8	1.0
P	38,250	184	1,085	5.4		982.2	982.2	983.2	1.0
Q	42,900	387	1,855	3.2		995.0	995.0	996.0	1.0
R	44,450	458	2,003	2.9		997.9	997.9	998.9	1.0
S	46,250	712	3,112	1.9		1002.1	1002.1	1003.1	1.0

[1]Feet Above Mouth [2]See Explanation in Section 4.2 Floodways

Table 4

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAYNE COUNTY, OH AND INCORPORATED AREAS

FLOODWAY DATA

Apple Creek

FLOODING SOURCE		FLOODWAY				1-PERCENT ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WIDTH REDUCED FROM PRIOR STUDY[4] (FEET)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Little Apple Creek 2									
T	51,500 [1]	168	1,295	4.6		1018.5	1018.5	1019.5	1.0
U	53,900 [1]	68	416	5.6		1024.6	1024.6	1025.6	1.0
V	56,650 [1]	88	368	6.3		1034.6	1034.6	1035.6	1.0
Cedar Run									
A	2,625 [1]	63	296	15.4		890.8	890.8	891.8	1.0
B	3,775 [1]	111	750	6.1		905.0	905.0	906.0	1.0
C	6,250 [1]	80	511	8.9		923.1	923.1	924.1	1.0
D	9,325 [1]	212	424	10.8	69	954.7	954.7	955.7	1.0
Chippewa Creek									
A	7.808 [2]	1,920	14,953	0.8		956.1	956.1	956.9	0.8
B	8.580 [2]	1,475	9,706	1.0		956.2	956.2	957.1	0.9
C	8.827 [2]	1,286	8,108	1.2		956.7	956.7	957.6	0.9
D	9.894 [2]	2,800	13,364	0.7		957.0	957.0	958.0	1.0
Christmas Run									
A[3]	450 [1]					856.5			
B[3]	2,000 [1]					857.1			
C	5,504 [1]	195	300	4.7		861.4	861.4	862.3	0.9
D	6,297 [1]	48	250	5.1	17	873.2	873.2	873.6	0.4

[1]Feet Above Mouth [2]Miles Above Mouth [3]WSE from Killbuck Creek overflow, shares floodway with Killbuck Creek [4]See Explanation in Section 4.2 Floodways

Table 4

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAYNE COUNTY, OH AND INCORPORATED AREAS

FLOODWAY DATA

Little Apple Creek 2, Cedar Run, Chippewa Creek, Christmas Run

FLOODING SOURCE		FLOODWAY				1-PERCENT ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WIDTH REDUCED FROM PRIOR STUDY[3] (FEET)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Christmas Run									
E	6,402 [1]	26	160	8.3	19	873.7	873.7	874.2	0.5
F	6,614 [1]	165	280	4.7	30	877.7	877.7	877.8	0.1
G	6,930 [1]	35	130	10.2		880.6	880.6	880.6	0.0
H	7,722 [1]	35	120	10.1		890.8	890.8	891.2	0.4
Clear Creek									
A	1,625 [1]	85	324	10.2		864.0	864.0	865.0	1.0
B	5,275 [1]	173	688	4.8		886.8	886.8	887.8	1.0
C	6,950 [1]	71	393	8.4		896.9	896.9	897.9	1.0
D	12,300 [1]	93	540	6.1		929.1	929.1	930.1	1.0
E	15,200 [1]	114	633	5.2		946.5	946.5	947.5	1.0
F	17,100 [1]	130	375	8.1		960.8	960.8	961.8	1.0
G	21,150 [1]	88	472	6.4		996.5	996.5	997.5	1.0
H	22,150 [1]	60	345	8.8		1005.2	1005.2	1006.2	1.0
I	25,075 [1]	109	518	5.9		1029.1	1029.1	1030.1	1.0
Killbuck Creek									
A	10,200 [2]	2,744	14,284	0.9		849.2	849.2	850.2	1.0
B	16,250 [2]	2,790	14,302	0.9		852.6	852.6	853.6	1.0
C	19,800 [2]	1,577	8,973	1.4		854.8	854.8	855.8	1.0
D	21,150 [2]	481	3,039	2.2		856.8	856.8	857.8	1.0

[1]Feet Above Mouth [2]Feet Above Valley Road [3]See Explanation in Section 4.2 Floodways

Table 4

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAYNE COUNTY, OH AND INCORPORATED AREAS

FLOODWAY DATA

Christmas Run, Clear Creek, Killbuck Creek

FLOODING SOURCE		FLOODWAY				1-PERCENT ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE [1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WIDTH REDUCED FROM PRIOR STUDY[2] (FEET)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Killbuck Creek									
E	22,450	1,483	10,241	0.6		857.1	857.1	858.1	1.0
F	24,900	842	5,933	1.1		858.7	858.7	859.7	1.0
G	28,000	1,859	17,053	0.4		860.7	860.7	861.7	1.0
H	31,400	1,758	11,384	0.5		860.9	860.9	861.9	1.0
I	35,300	930	4,691	1.2		861.9	861.9	862.9	1.0
J	39,450	678	3,269	1.1		862.6	862.6	863.6	1.0
K	40,600	1,140	4,426	0.8		863.8	863.8	864.8	1.0
L	45,100	1,156	5,194	0.7		865.4	865.4	866.4	1.0
M	47,750	1,171	5,183	1.0		866.5	866.5	867.5	1.0
N	51,150	466	2,292	2.9		870.5	870.5	871.5	1.0
O	52,900	453	2,661	2.5		872.8	872.8	873.8	1.0
P	55,400	506	2,670	1.3		874.0	873.7	875.0	1.0
Q	61,500	89	886	3.9		878.6	878.6	879.6	1.0
R	64,650	318	1,759	2.0		880.4	880.4	881.4	1.0
S	70,600	302	1,493	2.3		886.4	886.4	887.4	1.0
T	72,250	197	1,303	2.7		887.7	887.7	888.6	0.9
U	75,750	429	1,673	2.1		891.1	891.1	892.1	1.0
V	83,350	295	1,878	1.9		899.6	899.6	900.6	1.0
W	87,550	574	3,447	1.0		901.4	901.4	902.4	1.0
X	92,500	650	3,453	1.0		902.9	902.9	903.9	1.0
Y	97,900	786	3,222	1.1		905.3	905.3	906.3	1.0

[1]Feet above Valley Road [2]See Explanation in Section 4.2 Floodways

Table 4

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAYNE COUNTY, OH
AND INCORPORATED AREAS

FLOODWAY DATA

Killbuck Creek

FLOODING SOURCE		FLOODWAY				1-PERCENT ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE [1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WIDTH REDUCED FROM PRIOR STUDY[3] (FEET)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Killbuck Creek									
Z	99,450	153	975	3.6		906.8	906.8	907.8	1.0
AA	101,400	1,286	10,064	0.4		907.8	907.8	908.8	1.0
AB	106,800	148	803	4.7		922.1	922.1	923.1	1.0
AC	109,550	90	487	7.8		936.9	936.9	937.9	1.0
AD	110,450	214	1,308	2.9		939.3	939.3	940.3	1.0
AE	112,000	136	862	4.4		943.7	943.7	944.7	1.0
AF	118,100	83	813	4.7		951.6	951.6	952.6	1.0
AG	126,200	1607/0 [2]	10,702	0.4		952.9	952.9	953.9	1.0
AH	130,800	1047/387 [2]	3,329	1.0		956.9	956.9	957.9	1.0
AI	132,200	48	494	6.9		961.6	961.6	962.6	1.0
AJ	135,350	283	1,529	2.2		965.9	965.9	966.9	1.0
AK	136,750	260	1,756	2.2		967.6	967.6	968.6	1.0
AL	138,000	215	788	5.0		968.8	968.8	969.8	1.0
AM	140,550	170	944	4.1		974.0	974.0	975.0	1.0
AN	143,050	145	893	4.4		978.3	978.3	979.3	1.0
AO	146,850	163	1,063	3.7		984.7	984.7	985.7	1.0
AP	149,550	124	634	5.8		996.7	996.7	997.7	1.0

[1]Feet Above Valley Road [2]Total Width/Width Within Count Limits [3]See Explanation in Section 4.2 Floodways

Table 4

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAYNE COUNTY, OH
AND INCORPORATED AREAS

FLOODWAY DATA

Killbuck Creek

FLOODING SOURCE		FLOODWAY				1-PERCENT ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WIDTH REDUCED FROM PRIOR STUDY[4] (FEET)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Landis Ditch									
A	0.040 [1]	170	311	5.3		960.6	954.4 [3]	955.4	1.0
B	0.176 [1]	255	698	2.3		960.6	960.3 [3]	961.2	0.9
C	0.255 [1]	290	747	2.2		960.6	959.6 [3]	960.6	1.0
D	0.351 [1]	142	287	5.7		961.1	961.1	961.5	0.4
E	0.478 [1]	39	199	8.2		965.5	965.5	965.5	0.0
F	0.514 [1]	99	298	5.5		966.6	966.6	966.9	0.3
G	0.529 [1]	79	293	5.6		966.7	966.7	967.3	0.6
H	0.568 [1]	76	306	5.4		967.0	967.0	968.0	1.0
I	0.639 [1]	31	168	9.8		968.0	968.0	969.0	1.0
J	0.857 [1]	100	313	5.2		975.2	975.2	976.1	0.9
Little Apple Creek 1									
A	1,750 [2]	34	241	12.2		973.0	973.0	974.0	1.0
B	2,800 [2]	50	252	11.7		984.2	984.2	985.2	1.0
C	4,800 [2]	173	671	4.4		1005.4	1005.4	1006.4	1.0
D	6,350 [2]	120	340	8.7		1017.6	1017.6	1018.6	1.0
E	10,350 [2]	73	379	6.5		1050.0	1050.0	1051.0	1.0
F	14,550 [2]	101	568	4.4		1087.5	1087.5	1088.5	1.0
G	17,550 [2]	132	1,406	1.8		1105.1	1105.1	1106.1	1.0
H	20,900 [2]	73	520	4.8		1114.4	1114.4	1115.4	1.0

[1]Miles Above Mouth [2]Feet Above Portage Road [3]Elevations Without Considering Backwater Effect from River Styx [4]See Explanation in Section 4.2 Floodways

Table 4

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAYNE COUNTY, OH
AND INCORPORATED AREAS

FLOODWAY DATA

Landis Ditch, Little Apple Creek 1

FLOODING SOURCE		FLOODWAY				1-PERCENT ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WIDTH REDUCED FROM PRIOR STUDY[4] (FEET)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Little Killbuck Creek									
A	4,200 [1]	161	938	5.4		876.4	876.4	877.4	1.0
B	10,550 [1]	64	407	8.5		913.4	913.4	914.4	1.0
C	17,950 [1]	88	470	6.7		983.3	983.3	984.3	1.0
D	24,050 [1]	56	359	8.8		1043.4	1043.4	1044.4	1.0
Rathburn Run									
A	825 [1]	129	678	7.2		903.1	903.1	904.1	1.0
River Styx									
A	0.574 [2]	477	1,426	4.9		956.1	952.9 [3]	953.4	0.5
B	0.727 [2]	111	733	9.5		956.1	953.4 [3]	954.2	0.8
C	0.746 [2]	63	556	12.5		956.1	953.4 [3]	953.9	0.5
D	0.782 [2]	80	789	8.8		956.1	955.3 [3]	955.9	0.6
E	0.826 [2]	105	865	8.0		956.1	956.1 [3]	956.7	0.6
F	1.041 [2]	85	807	8.6	14	958.0	958.0	958.5	0.5
G	1.184 [2]	105	1,177	5.9		959.8	959.8	960.0	0.2
H	1.248 [2]	220	1,929	3.6		960.5	960.5	960.6	0.1
I	1.411 [2]	350	2,891	2.1		960.6	960.6	961.0	0.4
J	1.510 [2]	450	3,739	1.6		960.6	960.6	961.1	0.5
K	1.629 [2]	270	2,040	3.0		960.6	960.6	961.1	0.5

[1]Feet Above Mouth [2]Miles Above Mouth [3]Elevations without Considering Backwater Effect from Chippewa Creek [4]See Explanation in Section 4.2 Floodways

Table 4

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAYNE COUNTY, OH AND INCORPORATED AREAS

FLOODWAY DATA

Little Killbuck Creek, Rathburn Run, River Styx

FLOODING SOURCE		FLOODWAY				1-PERCENT ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WIDTH REDUCED FROM PRIOR STUDY[4] (FEET)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
River Styx									
L	1.699 [1]	230	1,872	3.3		961.1	961.1	961.4	0.3
M	1.751 [1]	210	1,710	3.6		961.1	961.1	961.4	0.3
N	1.900 [1]	310	2,381	2.6		961.1	961.1	961.9	0.8
O	2.079 [1]	500	3,643	1.7		961.3	961.3	962.3	1.0
P	2.259 [1]	730	4,608	1.3		961.4	961.4	962.4	1.0
Snyders Ditch									
A	1,373 [2]	680	3,780	0.1		860.8	859.4 [3]	860.4	1.0
B	2,323 [2]	190	840	0.5		860.8	859.4 [3]	860.4	1.0
C	2,746 [2]	100	170	2.7		860.8	860.5 [3]	861.4	0.9
D	3,274 [2]	35	70	6.5		865.7	865.7	866.2	0.5
E	3,802 [2]	15	40	9.1		871.2	871.2	871.6	0.4
Tommy Run									
A	2,940 [2]	380	2,124	1.4		969.0	969.0	969.0	0.0
B	3,917 [2]	150	765	3.8		969.0	969.0	969.1	0.1
C	20,953 [2]	85	324	7.2		1098.0	1098.0	1098.3	0.3

[1]Miles Above Mouth [2]Feet Above Mouth [3]Elevations Without Considering Backwater Effect from Killbuck Creek [4]See Explanation in Section 4.2 Floodways

Table 4

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAYNE COUNTY, OH AND INCORPORATED AREAS

FLOODWAY DATA

River Styx, Snyders Ditch, Tommy Run

5.0 INSURANCE APPLICATION

For flood insurance rating purposes, flood insurance zone designations are assigned to a community based on the results of the engineering analyses. These zones are as follows:

Zone A

Zone A is the flood insurance risk zone that corresponds to the 1-percent annual chance floodplains that are determined in the FIS by approximate methods. Because detailed hydraulic analyses are not performed for such areas, no BFEs or base flood depths are shown within this zone.

Zone AE

Zone AE is the flood insurance risk zone that corresponds to the 1-percent annual chance floodplains that are determined in the FIS by detailed methods. In most instances, whole-foot BFEs derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone X

Zone X is the flood insurance risk zone that corresponds to areas outside the 0.2-percent annual chance floodplain, areas within the 0.2-percent annual chance floodplain, areas of 1-percent annual chance flooding where average depths are less than 1 foot, areas of 1- percent annual chance flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 1-percent annual chance flood by levees. No BFEs or base flood depths are shown within this zone.

6.0 FLOOD INSURANCE RATE MAP

The DFIRM is designed for flood insurance and floodplain management applications.

For flood insurance applications, the maps designate flood insurance risk zones as described in Section 5.0 and, in the 1-percent annual chance floodplains that were studied by detailed methods, shows selected whole-foot BFEs or average depths. Insurance agents use the zones and BFEs in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

For floodplain management applications, the map shows by tints, screens, and symbols, the 1- and 0.2-percent annual chance floodplains, the 1-percent annual chance fully developed floodplains, floodways, and the locations of selected cross sections used in the hydraulic analyses and floodway computations.

The current Flood Insurance Rate Map presents flooding information for the geographic area of Wayne County. Historical data relating to the maps prepared for each community are presented in Table 5, Community Map History.

COMMUNITY NAME	INITIAL IDENTIFICATION	FLOOD HAZARD BOUNDARY MAP REVISION DATE	EFFECTIVE FIRM DATE	FIRM REVISIONS DATE
APPLE CREEK, VILLAGE OF	MARCH 29, 1974	AUGUST 20, 1976	MAY 17, 1989	None
BURBANK, VILLAGE OF	APRIL 18, 1975	None	MAY 17, 1989	None
CONGRESS, VILLAGE OF[1]	N/A	None	N/A	None
CRESTON, VILLAGE OF	FEBRUARY 1, 1974	MAY 28, 1976	MAY 17, 1989	None
DALTON, VILLAGE OF[1]	N/A	None	N/A	None
DOYLESTOWN, VILLAGE OF	AUGUST 18, 2009	None	AUGUST 18, 2009	None
FREDERICKSBURG, VILLAGE OF	JANUARY 16, 1974	MAY 21, 1976	SEPTEMBER 1, 1987	None
MARSHALLVILLE, VILLAGE OF[1]	N/A	None	N/A	None
MOUNT EATON, VILLAGE OF[1]	N/A	None	N/A	None
ORRVILLE, CITY OF	NOVEMBER 15, 1974	None	SEPTEMBER 1, 1987	None
RITTMAN, CITY OF	OCTOBER 26, 1973	None	DECEMBER 31, 1976	NOVEMBER 4, 1988
SHREVE, VILLAGE OF	MAY 17, 1989	None	MAY 17, 1989	None
SMITHVILLE, VILLAGE OF	APRIL 5, 1974	JUNE 4, 1976	AUGUST 1, 1987	None
WAYNE COUNTY (UNINCORPORATED AREAS)	JANUARY 3, 1975	FEBRUARY 18, 1977	MAY 17, 1989	None
WEST SALEM, VILLAGE OF[1]	APRIL 5, 1974	JUNE 4, 1976	JULY 17, 1986	None
WOOSTER, CITY OF	OCTOBER 26, 1973	None	FEBRUARY 2, 1977	None

[1]No Special Flood Hazard Areas Identified

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAYNE COUNTY, OHIO AND INCORPORATED AREAS

COMMUNITY MAP HISTORY

7.0 OTHER STUDIES

This FIS incorporates all previously published FISs and FIRMs for the incorporated and unincorporated areas within Wayne County.

This report either supersedes or is compatible with all previous studies published on streams studied in this report and should be considered authoritative for the purposes of the National Flood Insurance Program.

8.0 LOCATION OF DATA

Information concerning the pertinent data used in the preparation of this study can be obtained by contacting FEMA, Flood Insurance and Mitigation Division, 536 South Clark Street, Sixth Floor, Chicago, Illinois 60605.

9.0 BIBLIOGRAPHY AND REFERENCES

1. Federal Emergency Management Agency, Flood Insurance Study, City of Rittman,Wayne and Medina Counties, Ohio, November 4, 1988.

2. Federal Emergency Management Agency, Flood Insurance Study, Wayne County, Ohio and Incorporated Areas, May 17, 1989.

3. U.S. Department of Agriculture, Soil Conservation Service, Killbuck Creek Flood Hazard Study, Wayne County, Ohio, Columbus, Ohio, August 1982.

4. U.S. Department of Housing and Urban Development, Federal Insurance Administration, Flood Insurance Study, City of Wooster, Wayne County, Ohio, February 1977.

5. Federal Emergency Management Agency, Flood Insurance Rate Map, Village of Fredericksburg, Wayne County, Ohio, September 1987.

6. Federal Emergency Management Agency, Flood Insurance Rate Map, Village of Smithville, Wayne County, Ohio, August 1987.

7. Federal Emergency Management Agency, Flood Insurance Rate Map, Village of West Salem, Wayne County, Ohio, July 1986.

8. Federal Emergency Management Agency, Federal Insurance Administration, Flood Insurance Rate Map, Village of Clinton, Summit County, Ohio, July 1980.

9. Federal Emergency Management Agency, Flood Insurance Rate Map, City of Orrville, Wayne County, Ohio, September 1987.

10. U.S. Department of Agriculture, Soil Conservation Service, Chippewa Creek Flood Hazard Study, Wayne County, Ohio, Columbus, Ohio August 1980.

11. U.S. Department of the Census, Bureau of the Census, Census 2006, using American Fact Finder, retrieved June 12, 2007 from http://factfinder.census.gov.

12. U.S. Weather Bureau, Ohio Agricultural Research and Development Center, Climatological Summary, Wooster, Ohio, Wooster, Ohio, December 1966.

13. State of Ohio, Department of Natural Resources, Division of Water, Floods in Ohio, Bulletin 45, Columbus, Ohio, May 1977.

14. Medina and Wayne Soil Conservation Districts, Medina and Wayne County Commissioners, and Muskingum Watershed Conservancy District with Assistance from the U.S. Department of Agriculture, Chippewa Creek Watershed Work Plan, Medina and Wayne Counties, Ohio, 1960.

15. U.S. Army Corps of Engineers, Statistical Methods in Hydrology, Leo R. Beard, Sacramento, California, January 1962.

16. U.S. Department of the Interior, Geological Survey, Water-Resources Investigation Report 03-4164, Techniques for Estimating Flood-Peak Discharges of Rural, Unregulated Streams in Ohio, G.F. Koltun, 2003.

17. U.S. Department of Agriculture, Soil Conservation Service, Technical Release No. 20, Computer Program for Project Formulation, Hydrology, Washington, D.C., 1982.

18. U.S. Department of the Interior, Geological Survey, Interagency Advisory Committee on Water Data, Office of Water Data Coordination, Hydrology Subcommittee, Bulletin No. 17B, Guidelines for Determining Flood Flow Frequency, September 1981, revised March 1982.

19. U.S. Army Corps of Engineers, Hydrologic Engineering Center, HEC-RAS River Analysis, Davis, California.

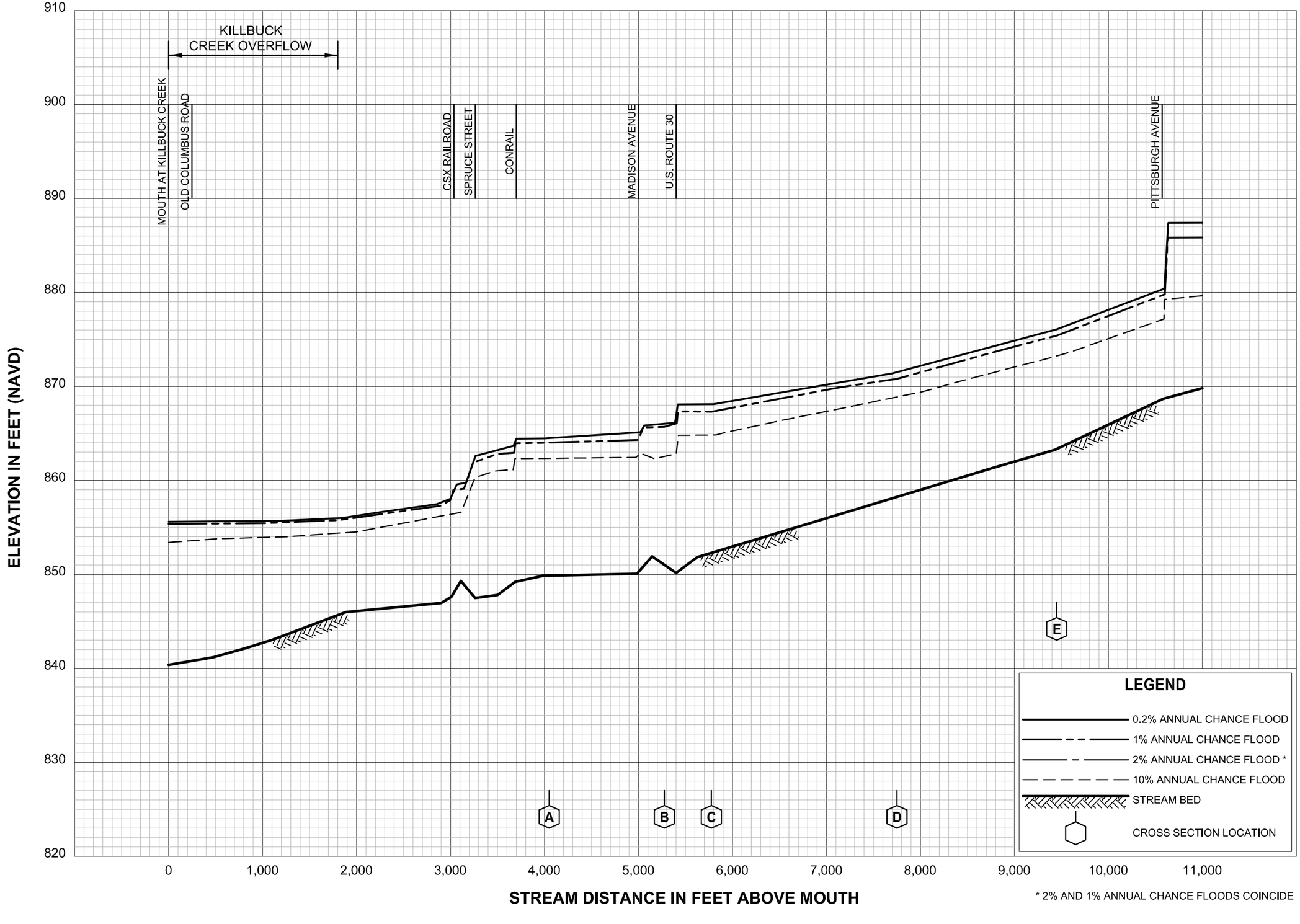
20. U.S. Department of Agriculture, Soil Conservation Service, Technical Release No. 61, WSP-2 Computer Program, May 1976.

21. U.S. Geological Survey, 7.5 Minute Series Topographic Maps, Scale 1:24000, Contour Interval 10 feet: Rittman, Ohio, 1961, photorevised 1978.

22. U.S. Army Corps of Engineers, Hydrologic Engineering Center, HEC-2 Water-Surface Profiles, Generalized Computer Program, Davis, California, April 1984.

23. U.S. Department of Agriculture, Soil Conservation Service, Technical Release No. 64, Floodway Determination Computer Program, Glenn Dale, Maryland, June 1978.

24. Federal Emergency Management Agency, Flood Insurance Study, Medina County, Ohio Unincorporated Areas, February 15, 1983.



FLOOD PROFILES

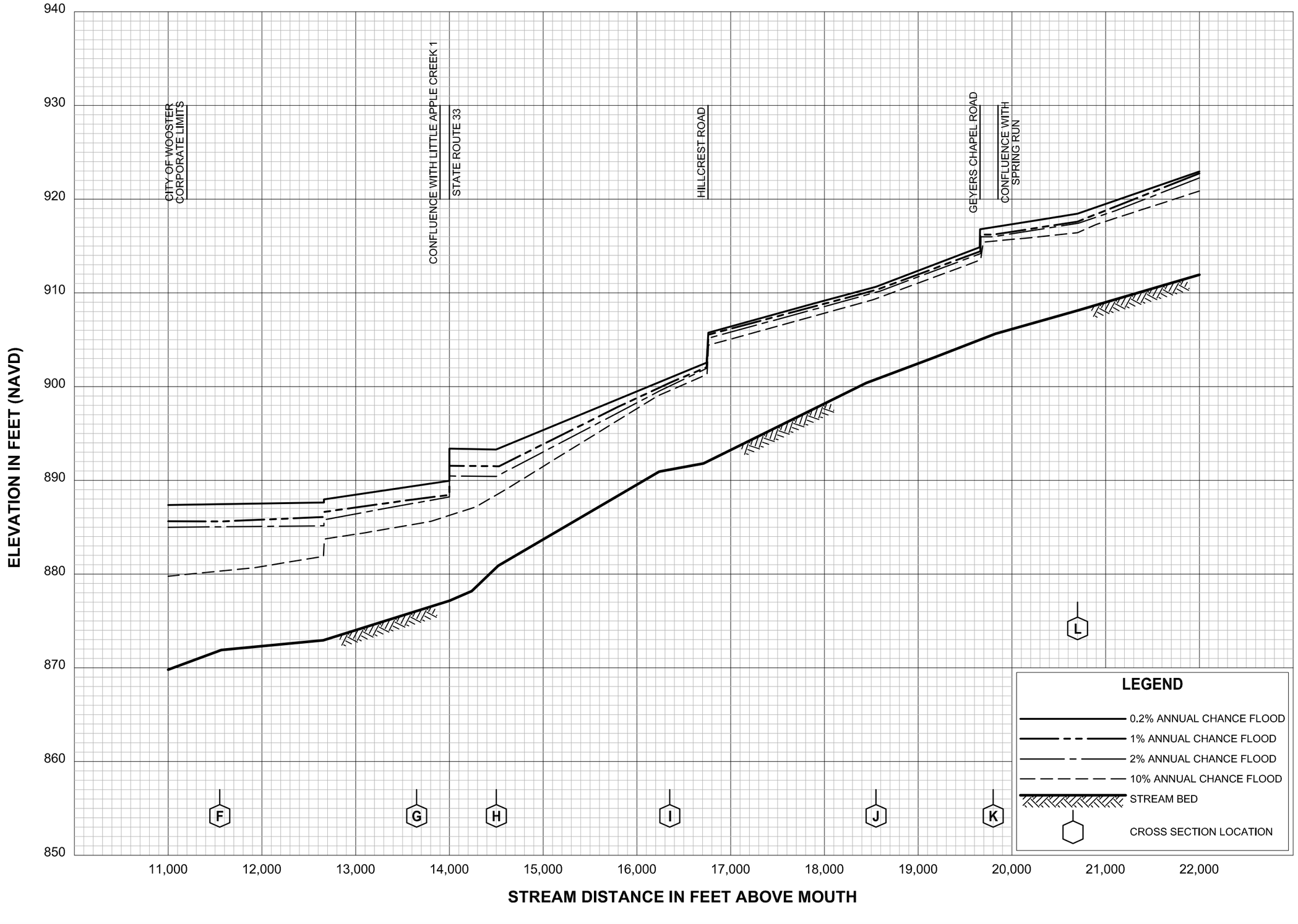
APPLE CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAYNE COUNTY, OH

AND INCORPORATED AREAS

01P



FLOOD PROFILES

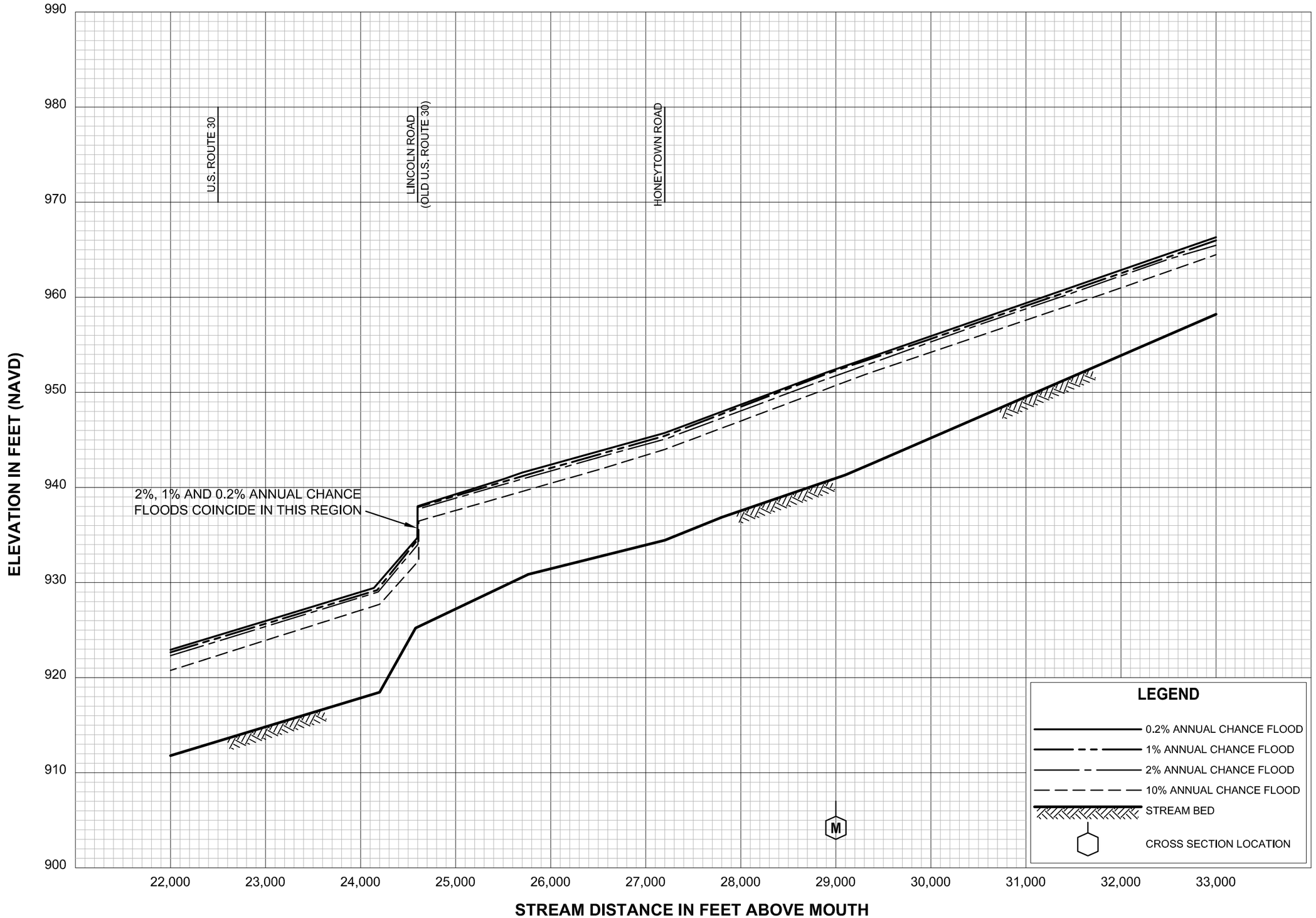
APPLE CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAYNE COUNTY, OH

AND INCORPORATED AREAS

02P



FLOOD PROFILES

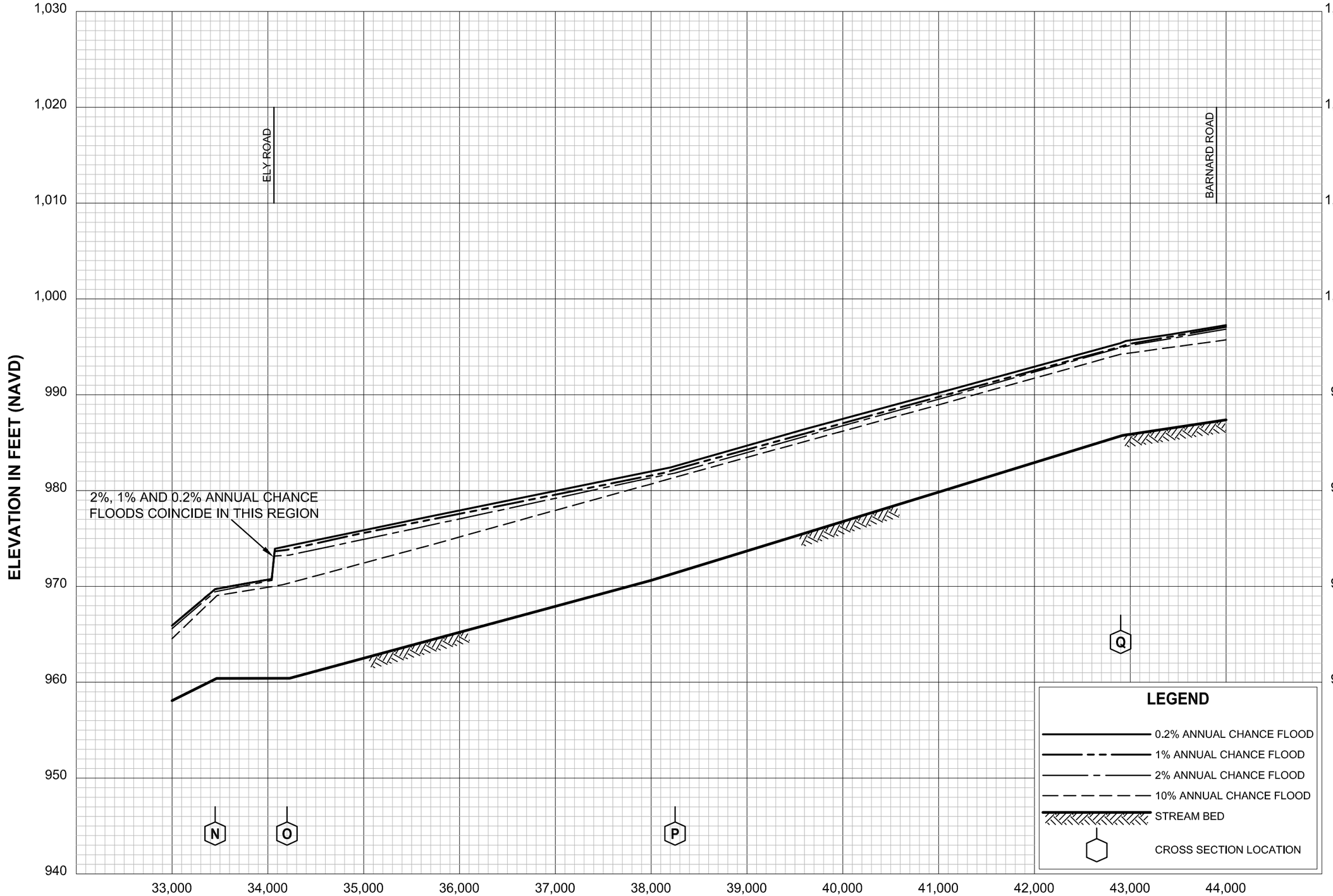
APPLE CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAYNE COUNTY, OH

AND INCORPORATED AREAS

03P



FLOOD PROFILES

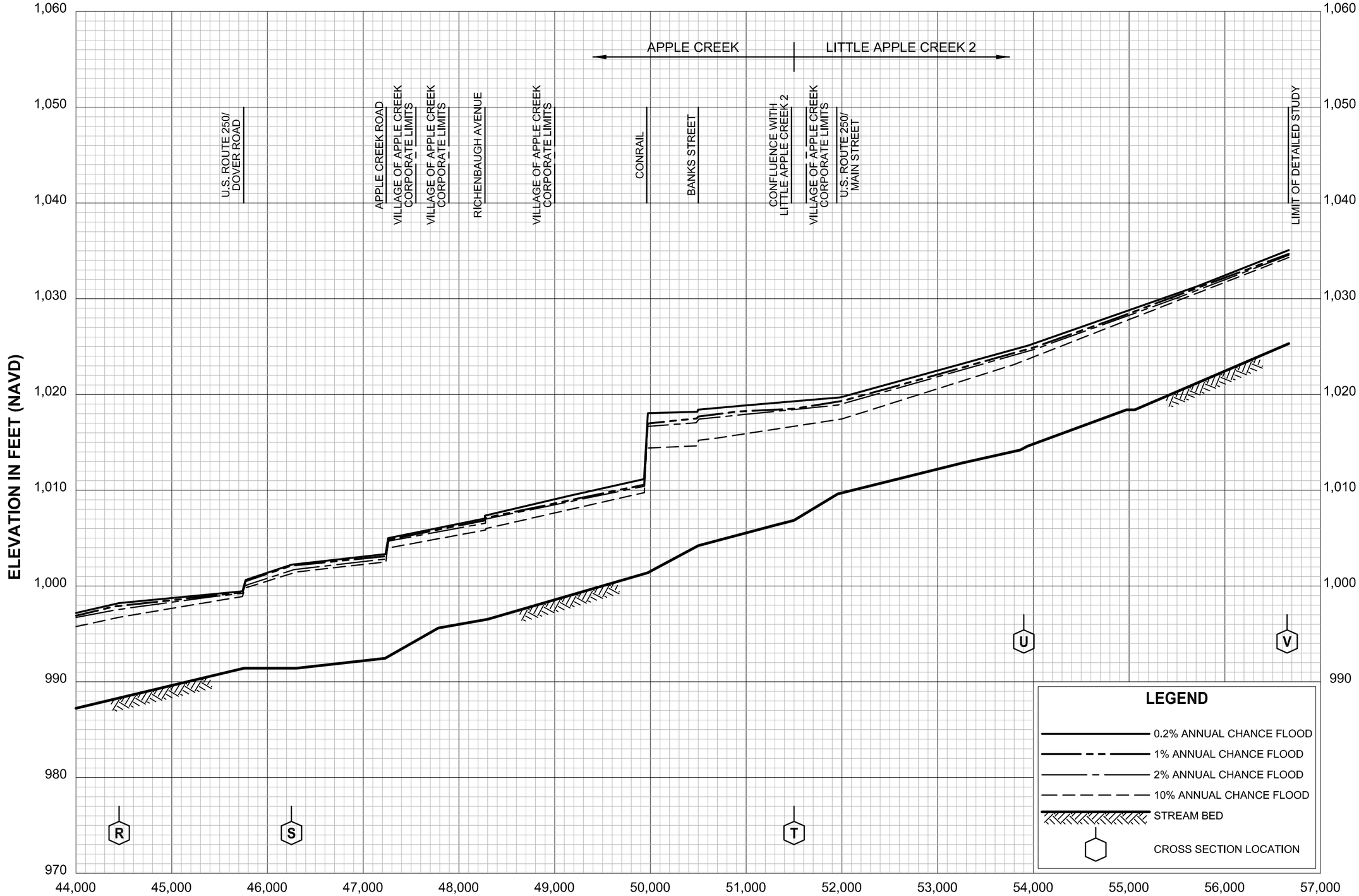
APPLE CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAYNE COUNTY, OH

AND INCORPORATED AREAS

04P



FLOOD PROFILES

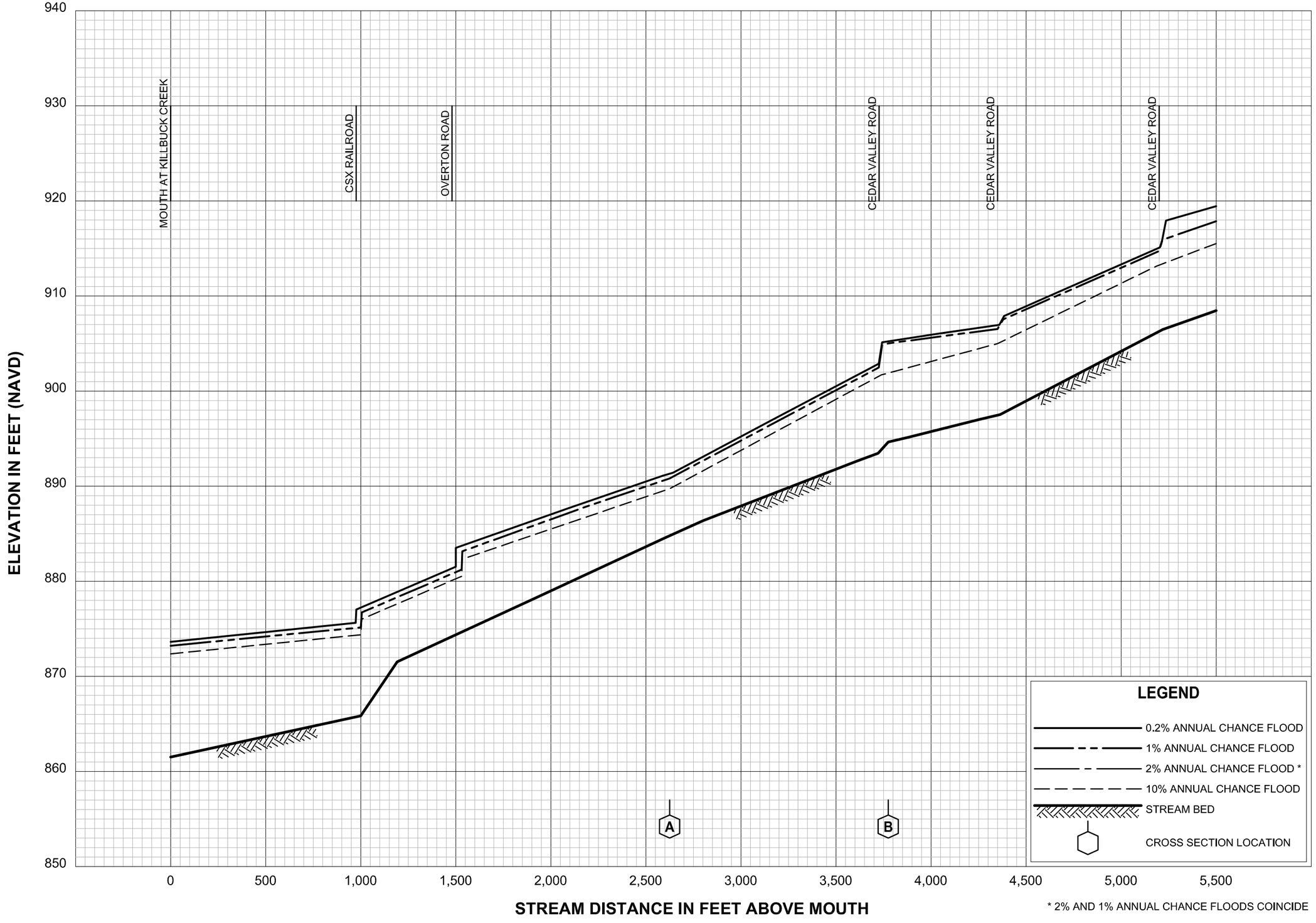
APPLE CREEK / LITTLE APPLE CREEK 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAYNE COUNTY, OH

AND INCORPORATED AREAS

05P



FLOOD PROFILES

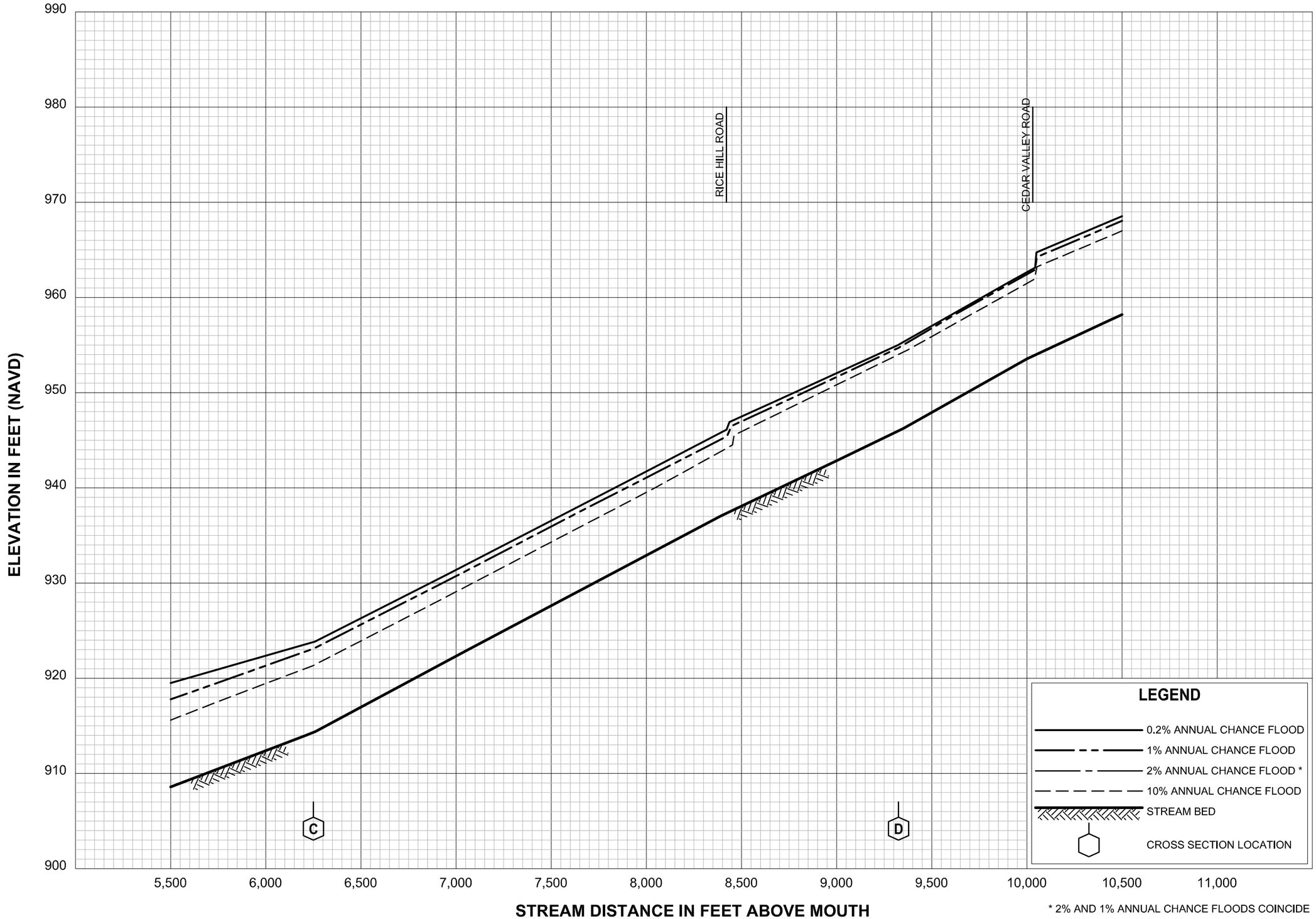
CEDAR RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAYNE COUNTY, OH

AND INCORPORATED AREAS

06P



FLOOD PROFILES

CEDAR RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAYNE COUNTY, OH

AND INCORPORATED AREAS

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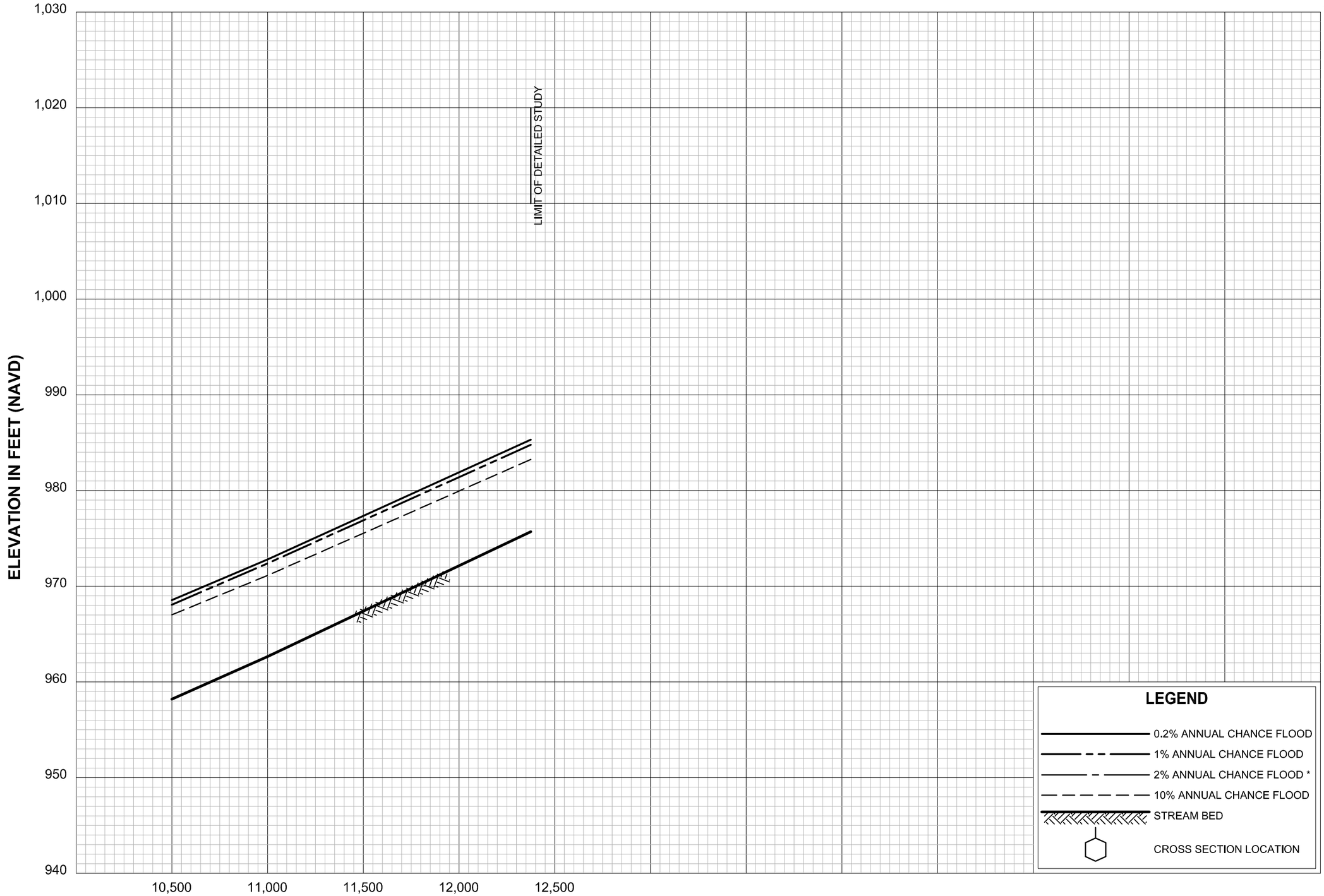

FLOOD PROFILES

CEDAR RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAYNE COUNTY, OH

AND INCORPORATED AREAS

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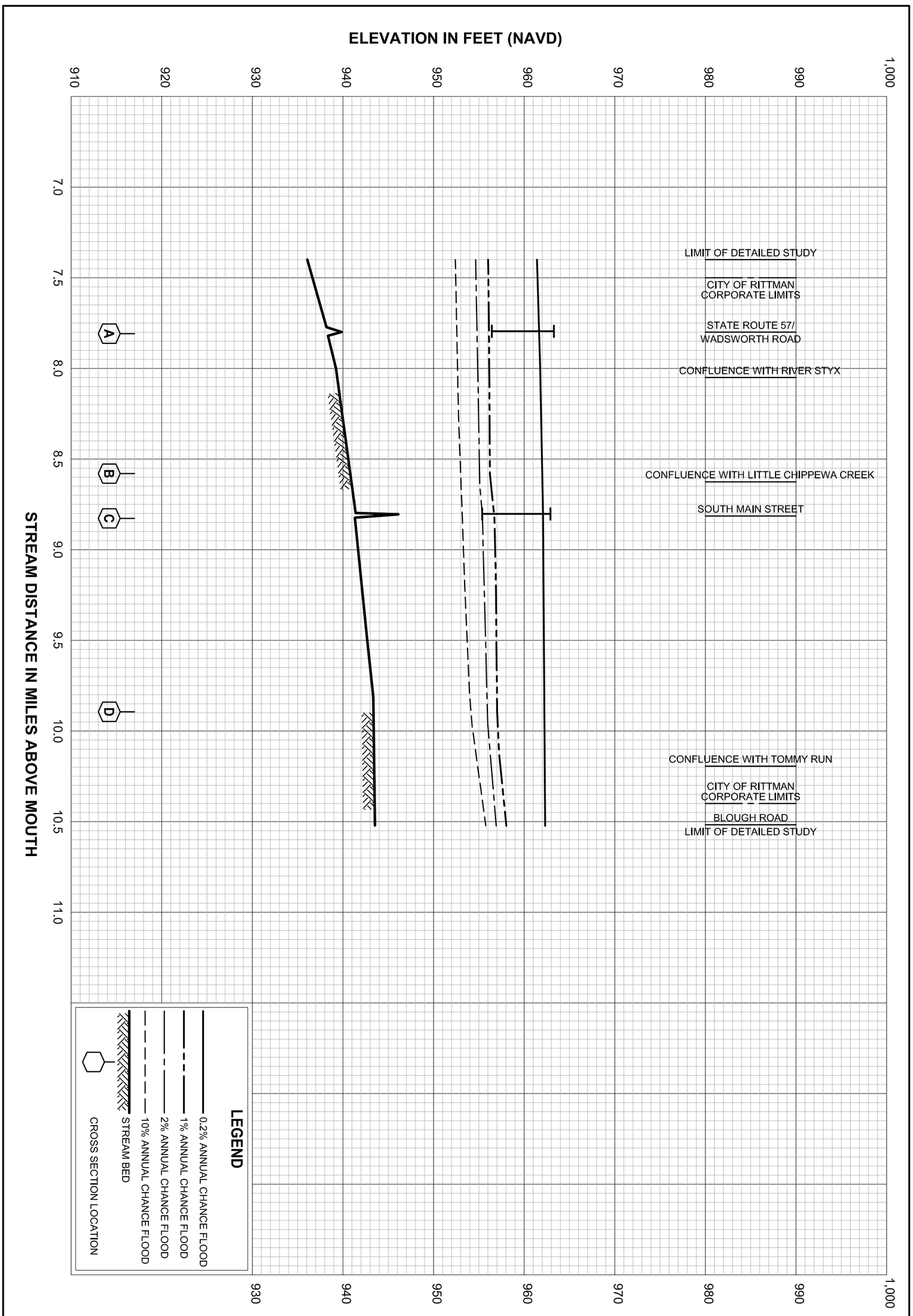

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAYNE COUNTY, OH

AND INCORPORATED AREAS

FLOOD PROFILES

CHIPPEWA CREEK

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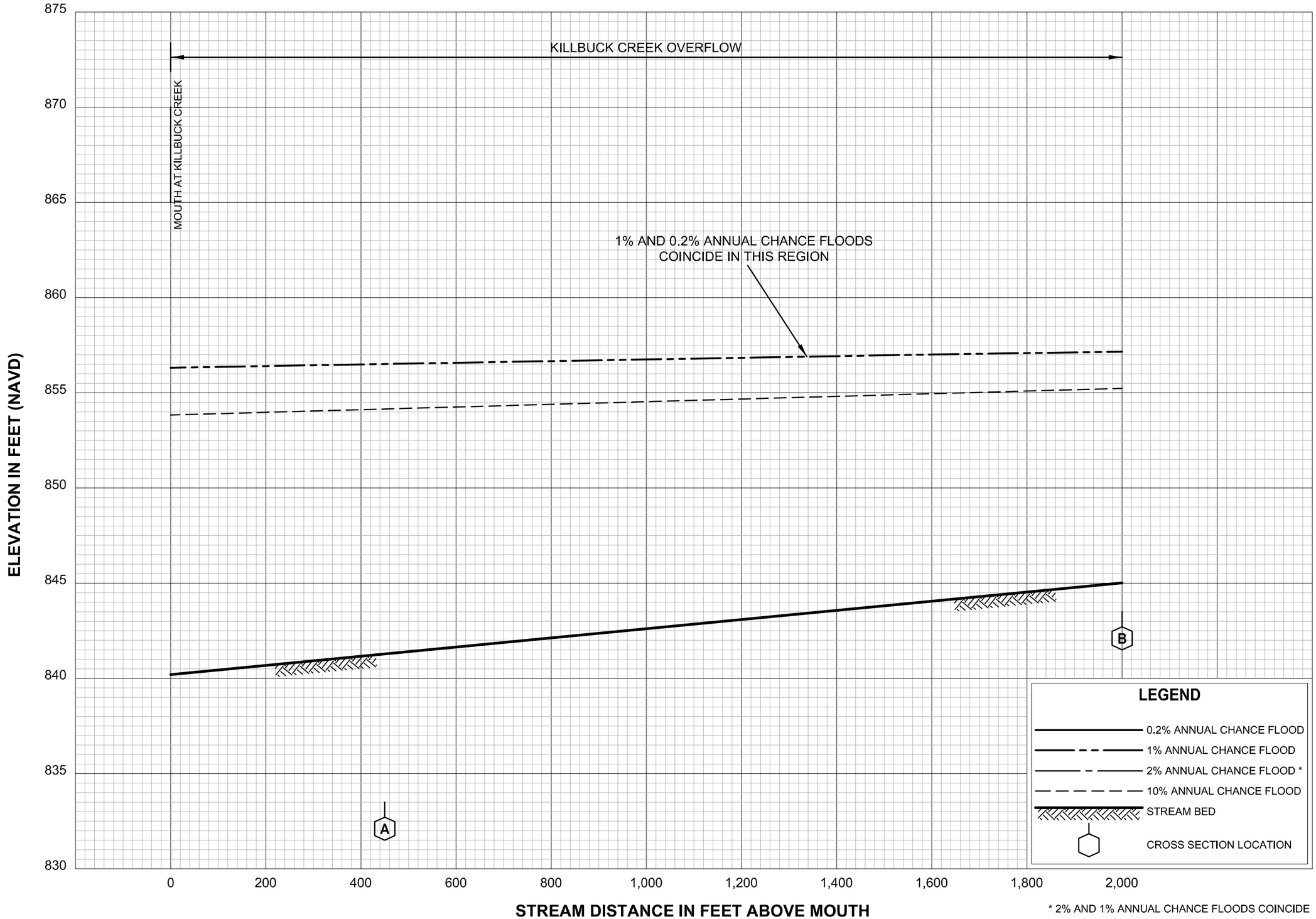


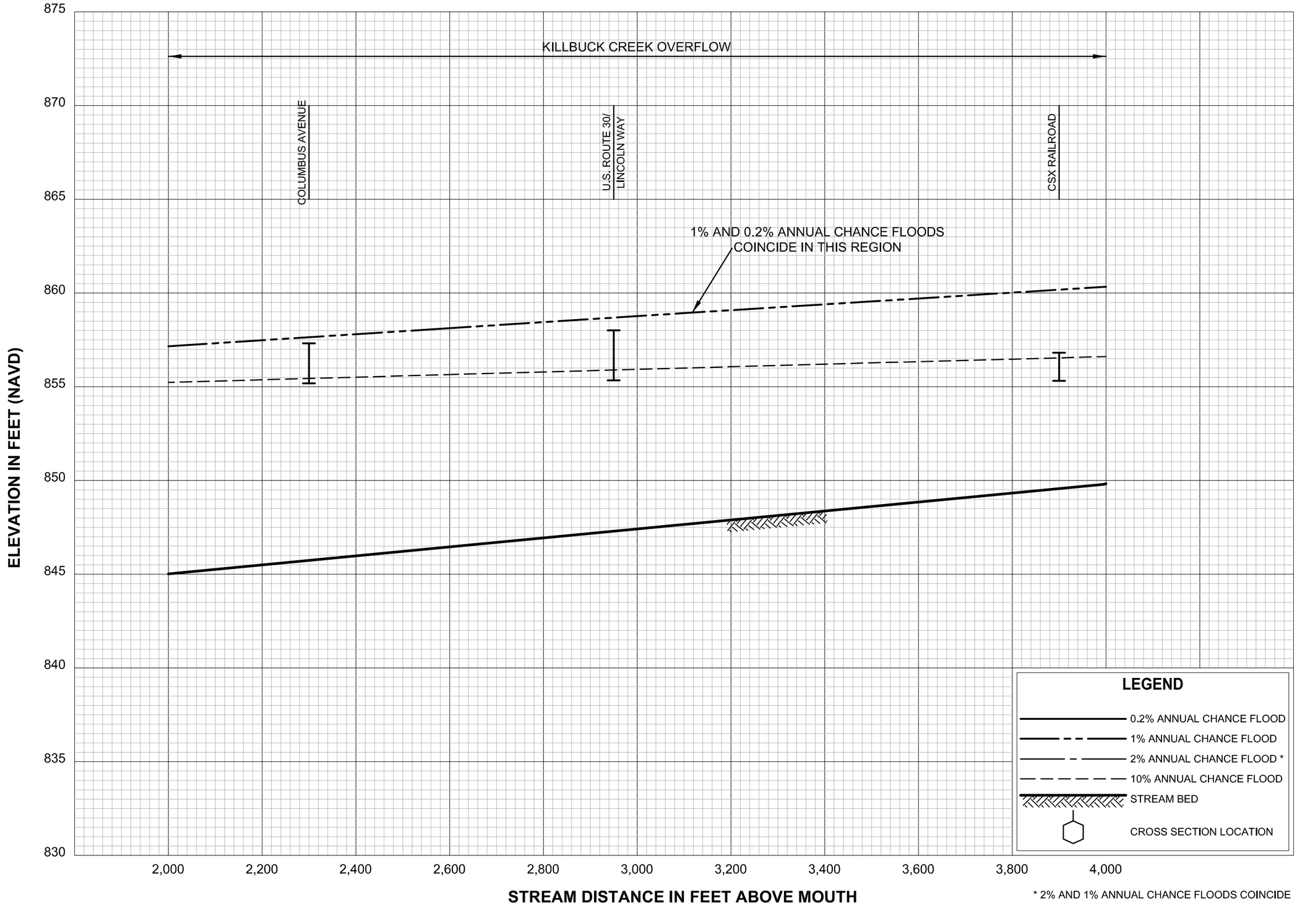
FLOOD PROFILES

CHRISTMAS RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAYNE COUNTY, OH

AND INCORPORATED AREAS



FLOOD PROFILES

CHRISTMAS RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAYNE COUNTY, OH

AND INCORPORATED AREAS

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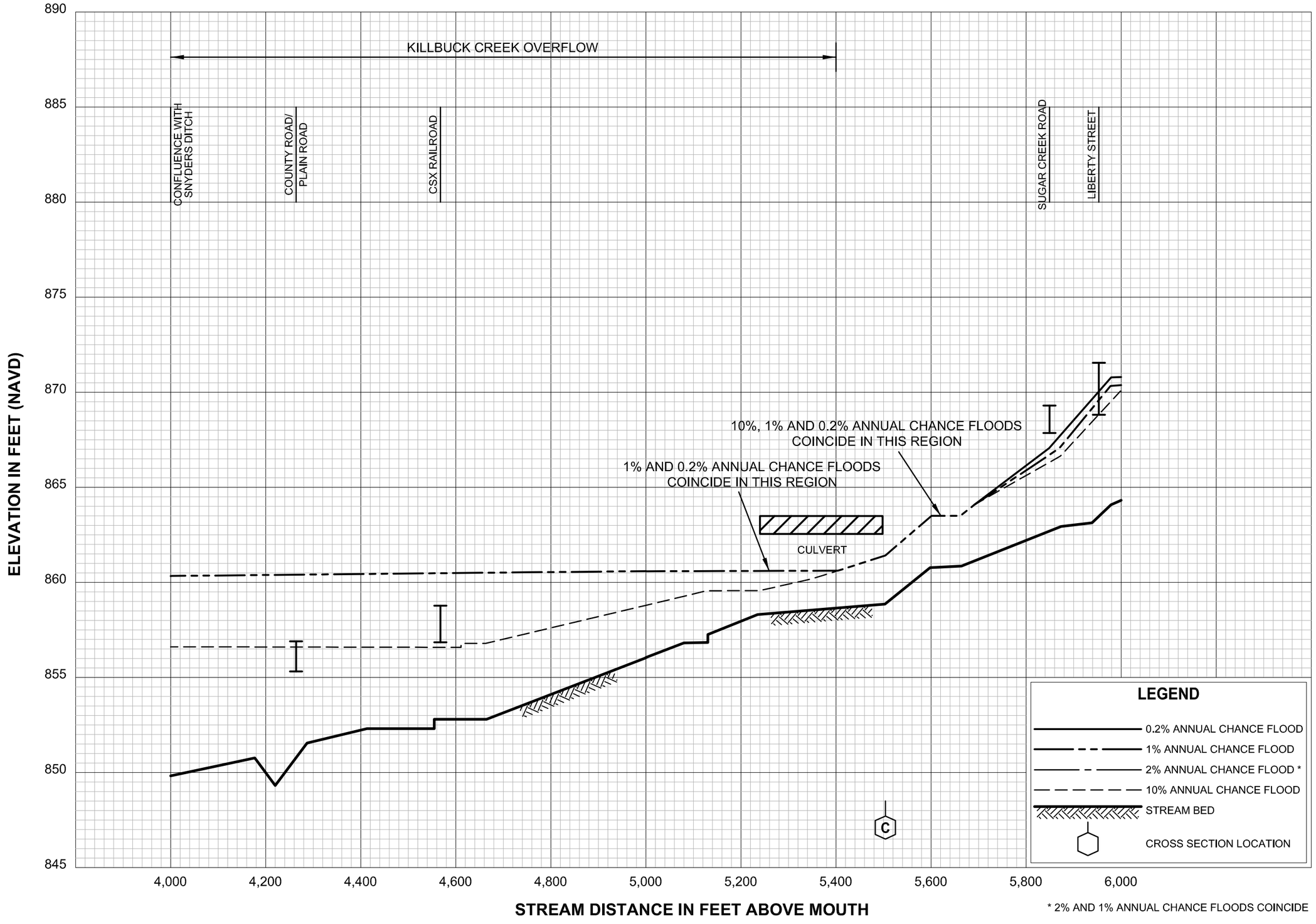


FLOOD PROFILES

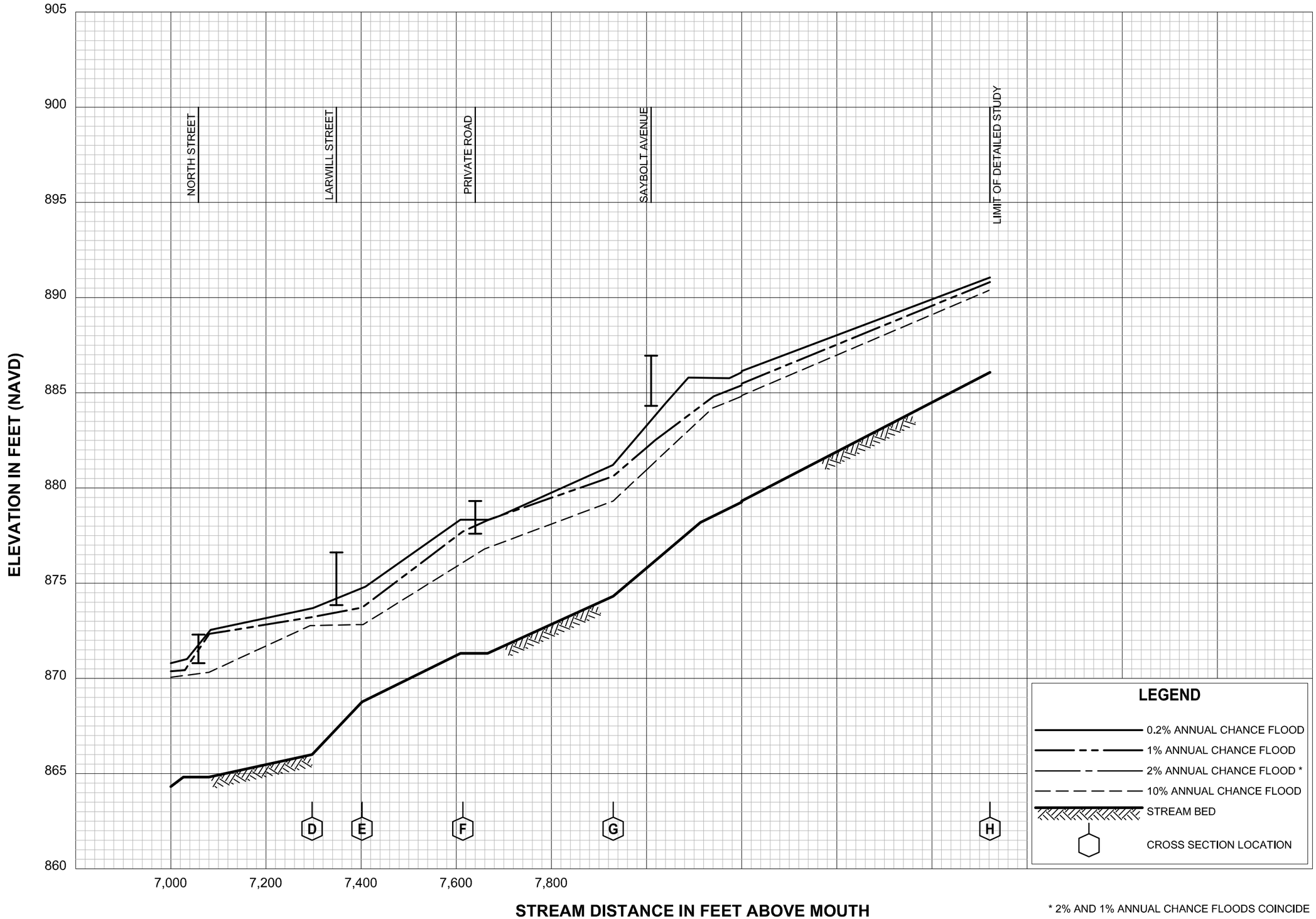
CHRISTMAS RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAYNE COUNTY, OH

AND INCORPORATED AREAS

12P



* 2% AND 1% ANNUAL CHANCE FLOODS COINCIDE

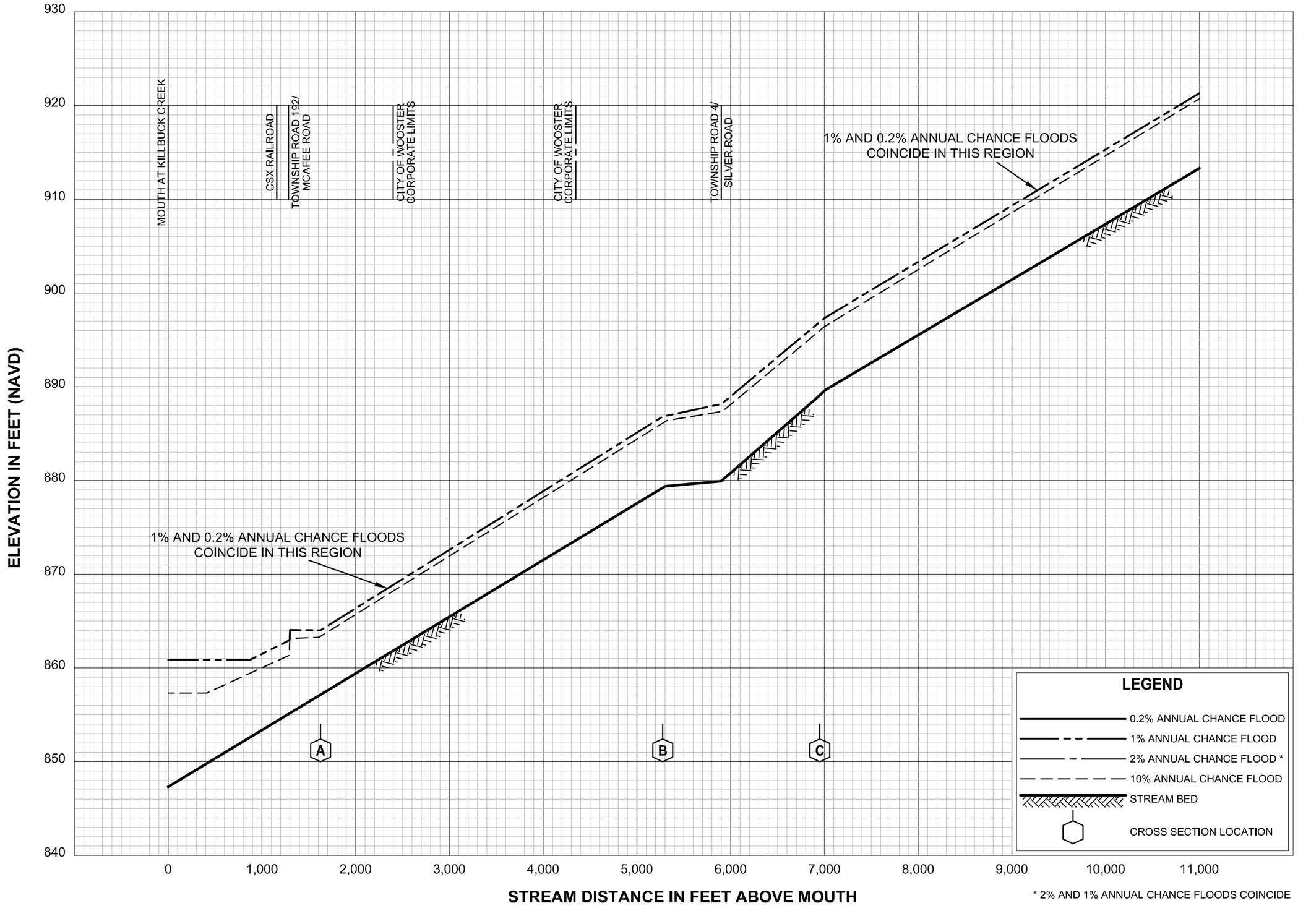
FLOOD PROFILES

CHRISTMAS RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAYNE COUNTY, OH

AND INCORPORATED AREAS



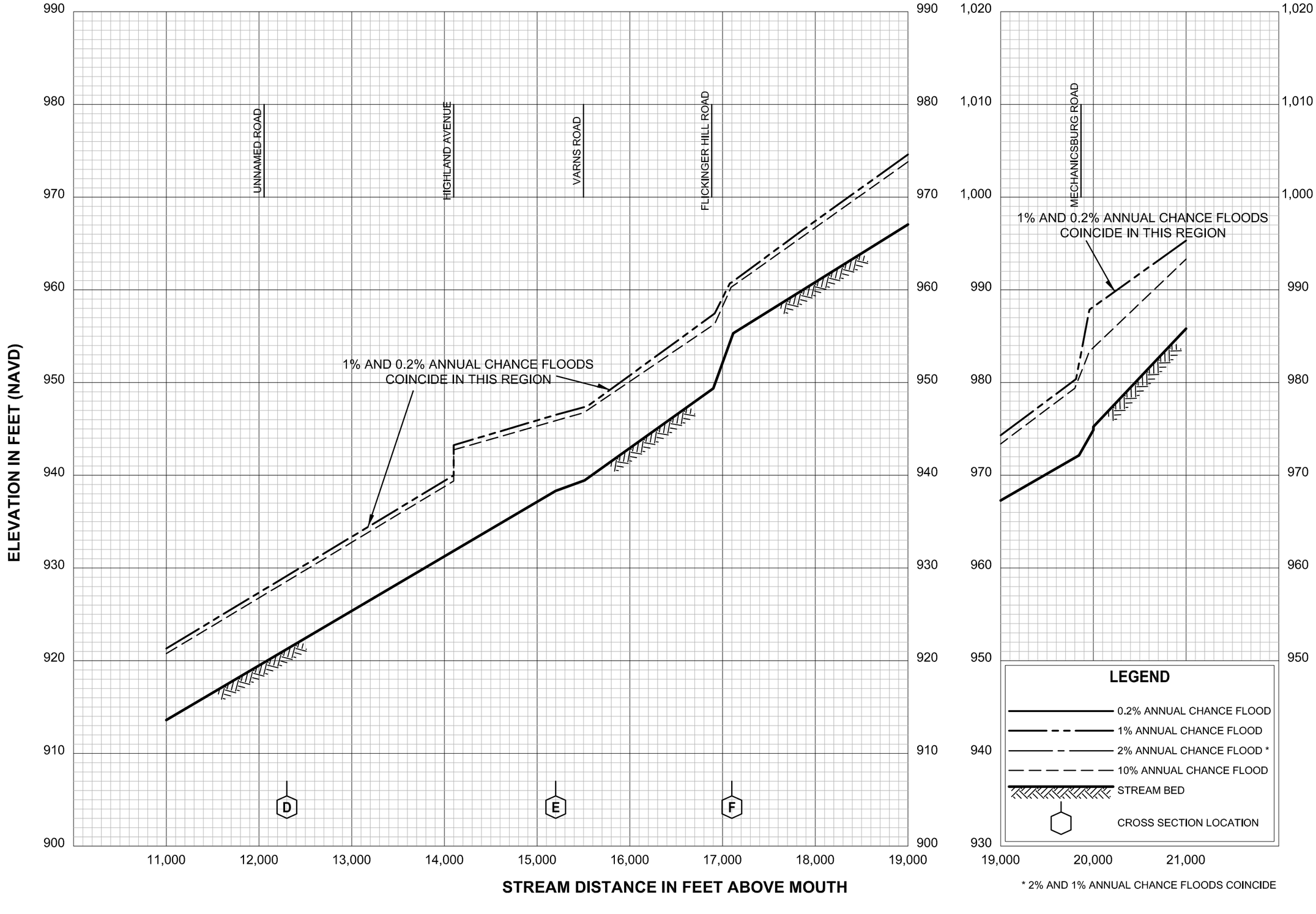
FLOOD PROFILES

CLEAR CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAYNE COUNTY, OH

AND INCORPORATED AREAS



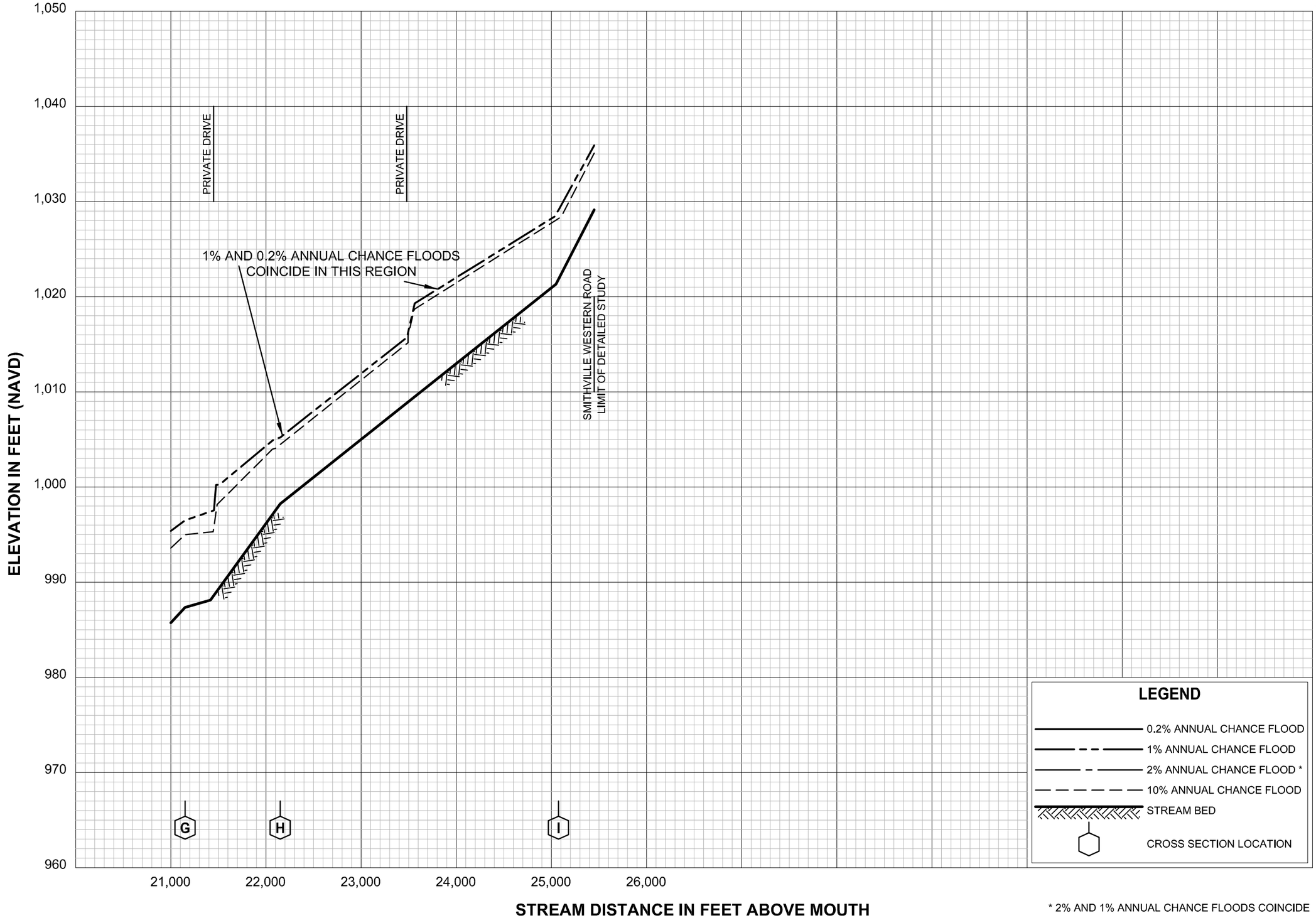
FLOOD PROFILES

CLEAR CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAYNE COUNTY, OH

AND INCORPORATED AREAS



FLOOD PROFILES

CLEAR CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAYNE COUNTY, OH

AND INCORPORATED AREAS

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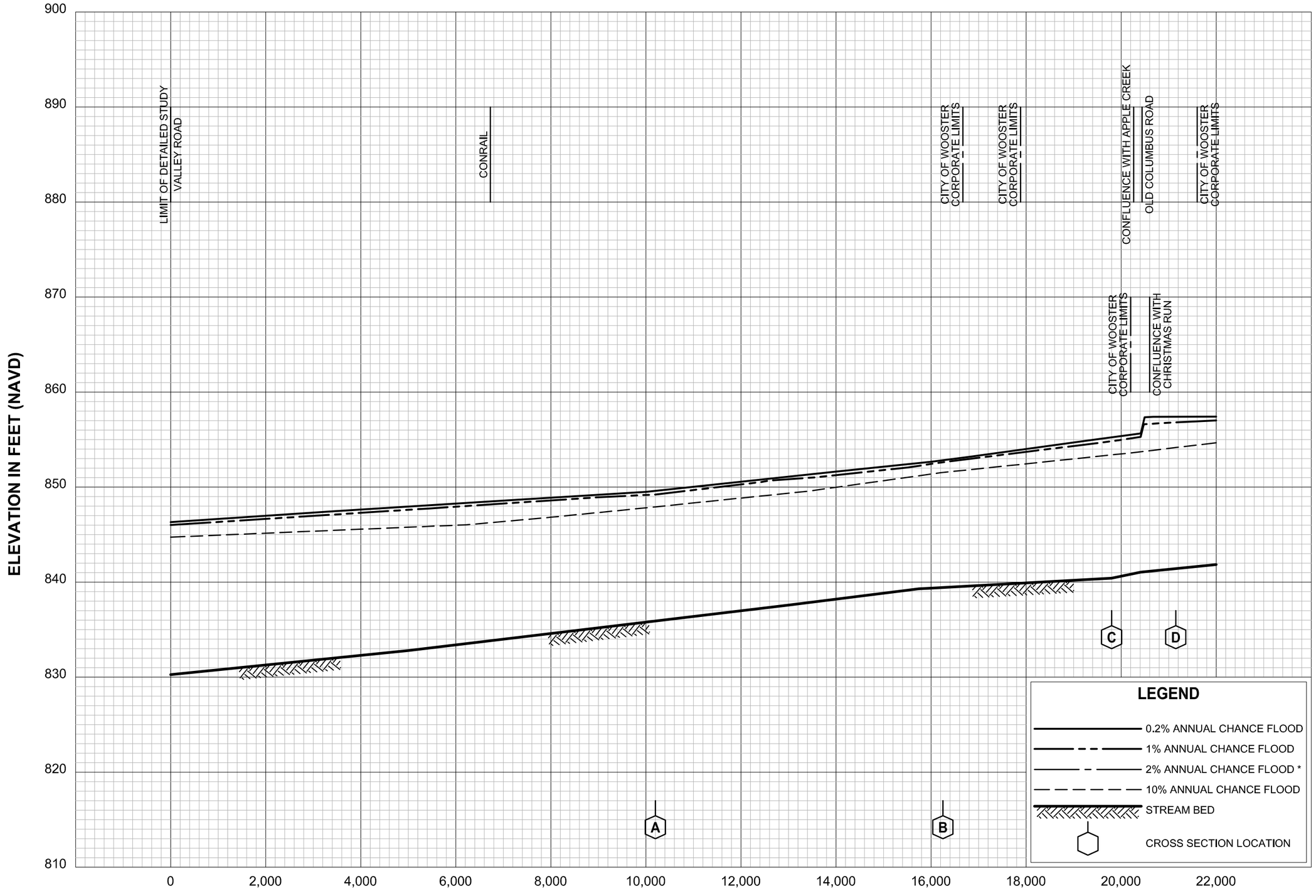


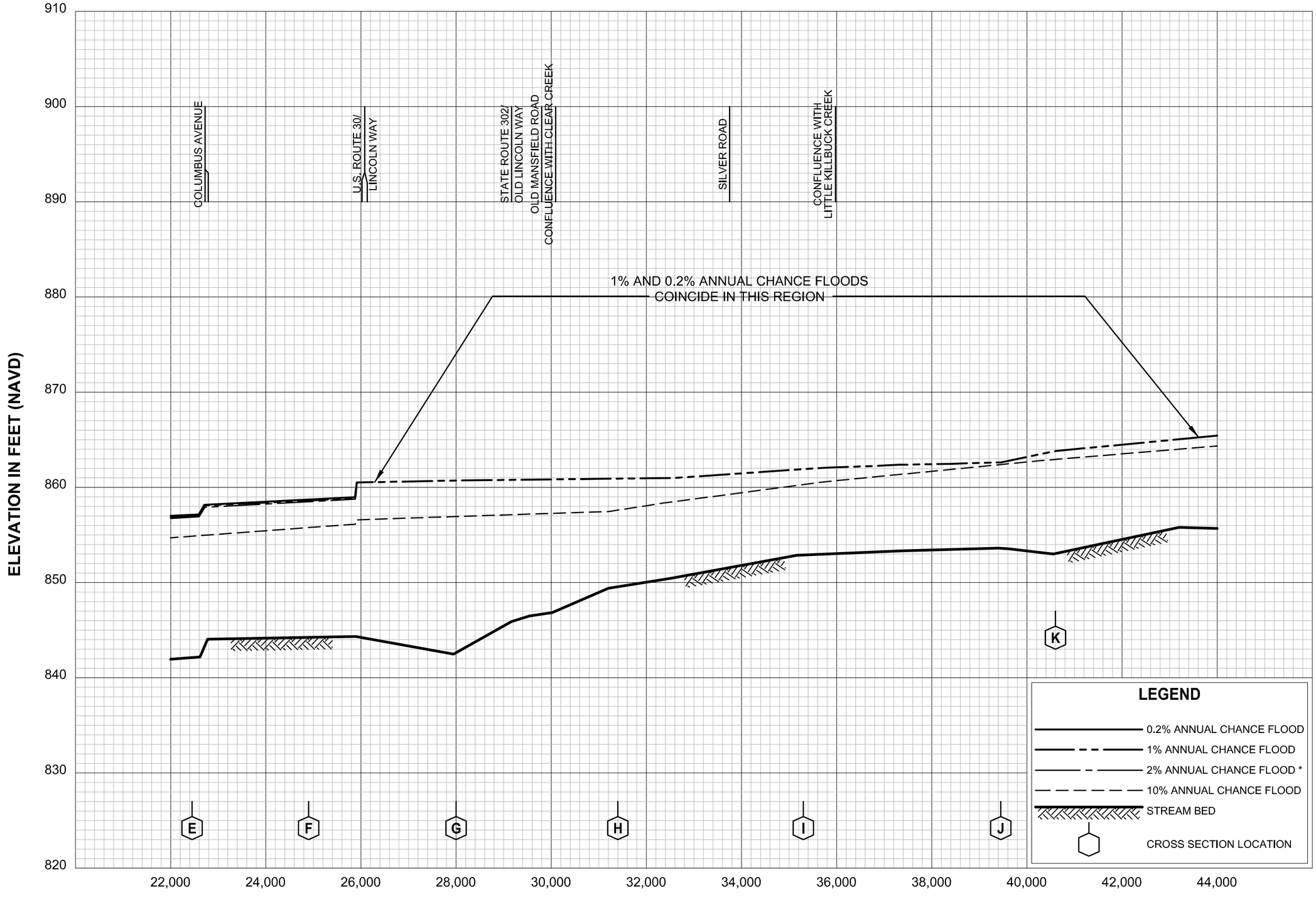
FLOOD PROFILES

KILLBUCK CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAYNE COUNTY, OH

AND INCORPORATED AREAS



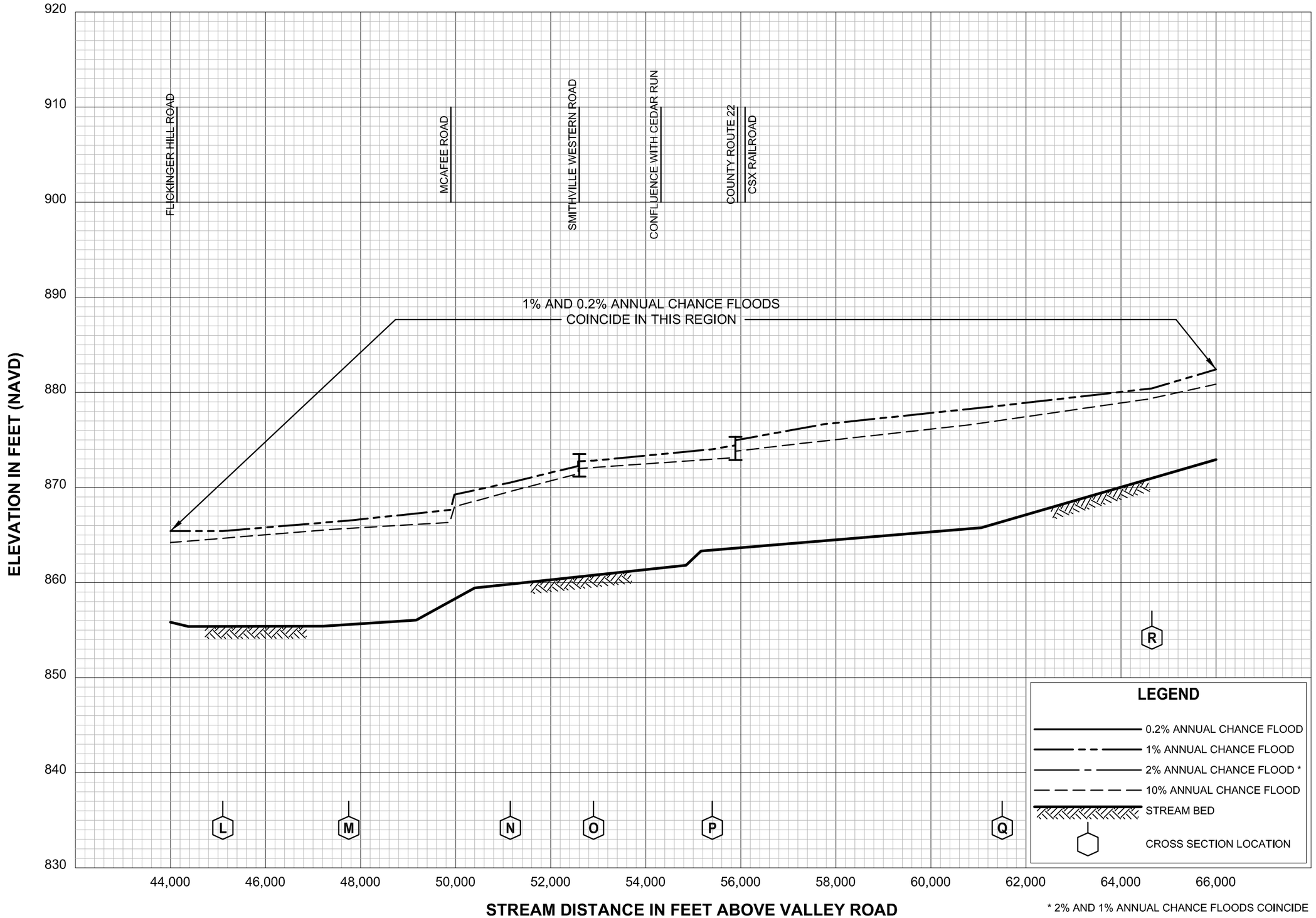
FLOOD PROFILES

KILLBUCK CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAYNE COUNTY, OH

AND INCORPORATED AREAS



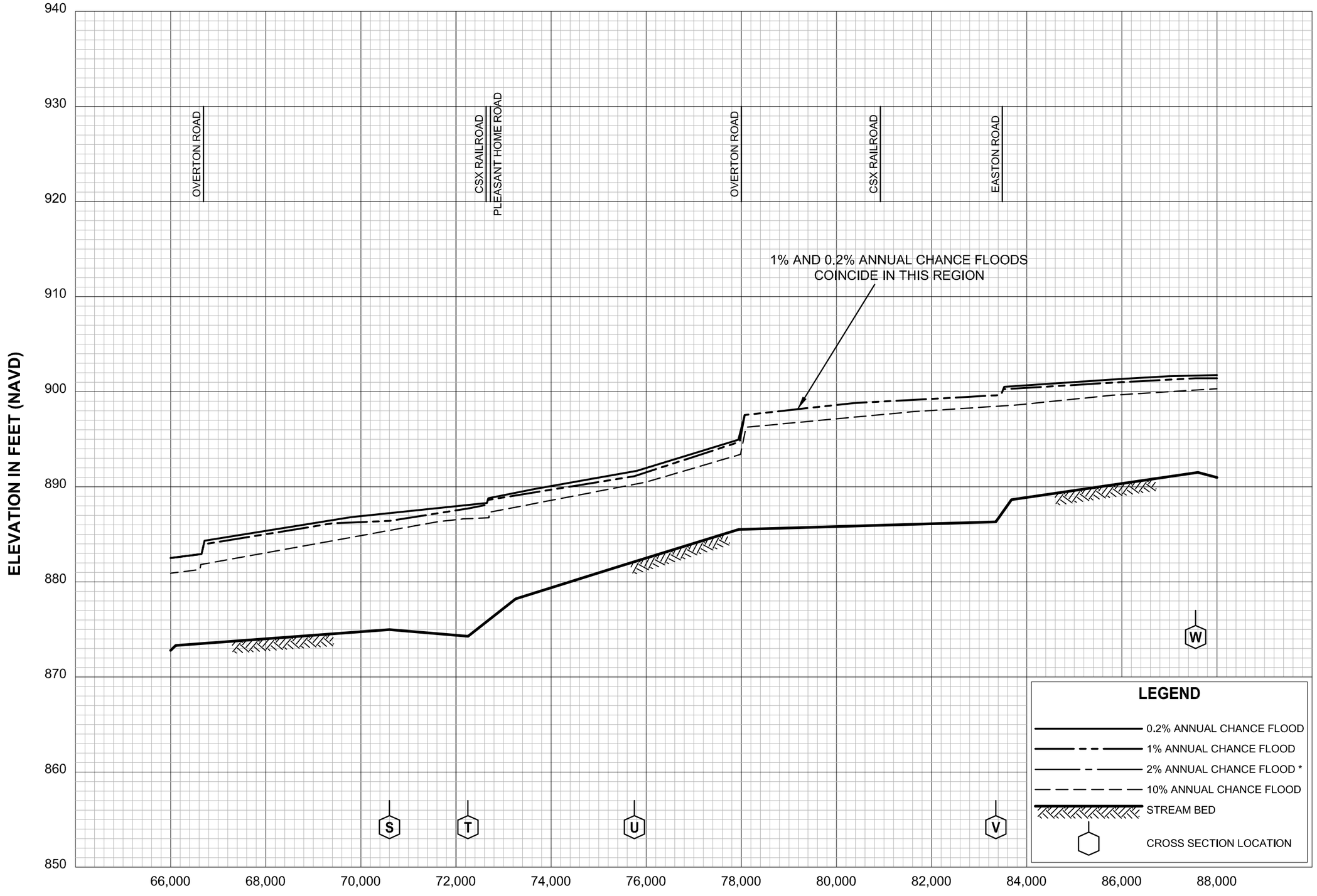
FLOOD PROFILES

KILLBUCK CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAYNE COUNTY, OH

AND INCORPORATED AREAS



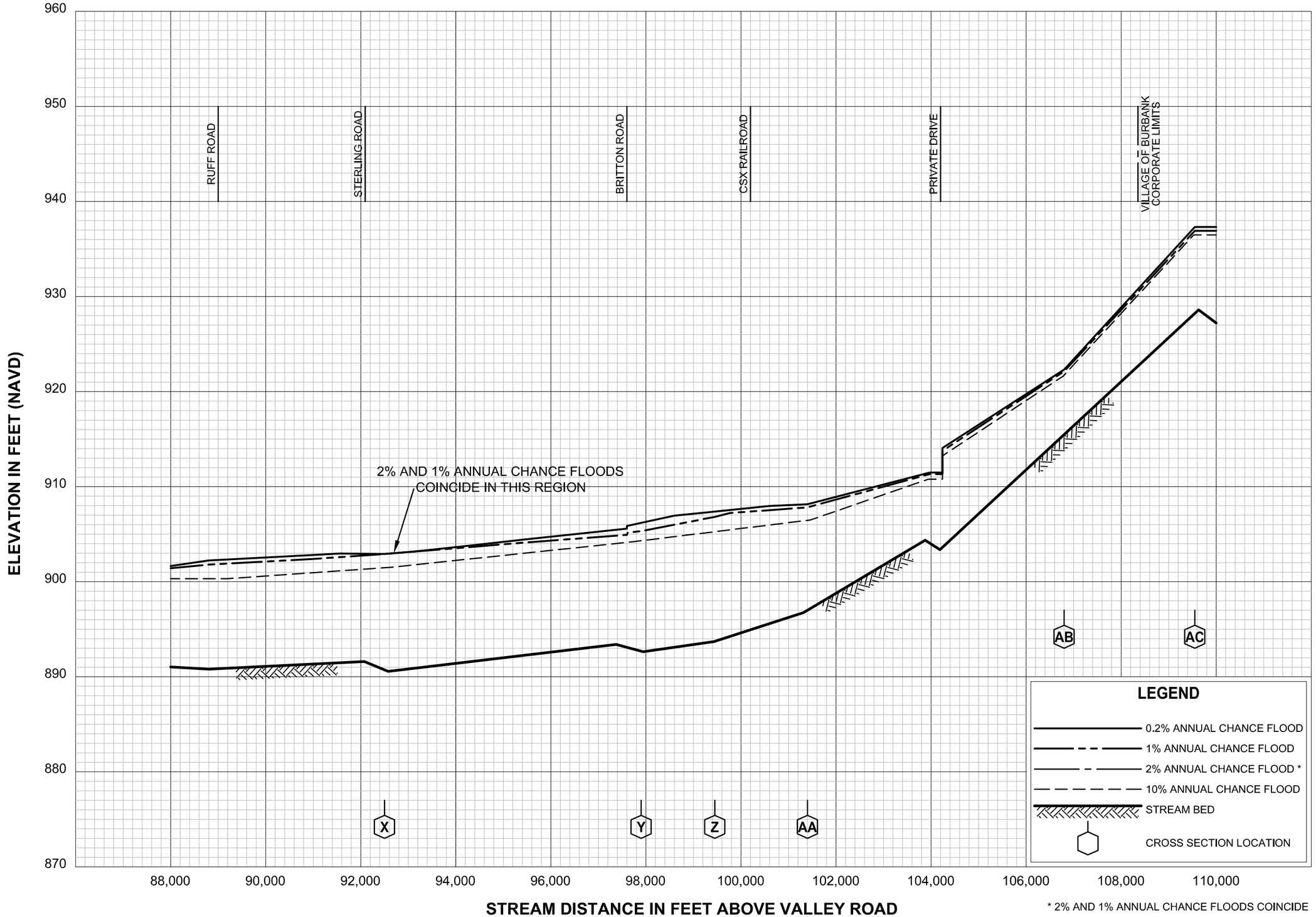
FLOOD PROFILES

KILLBUCK CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAYNE COUNTY, OH

AND INCORPORATED AREAS



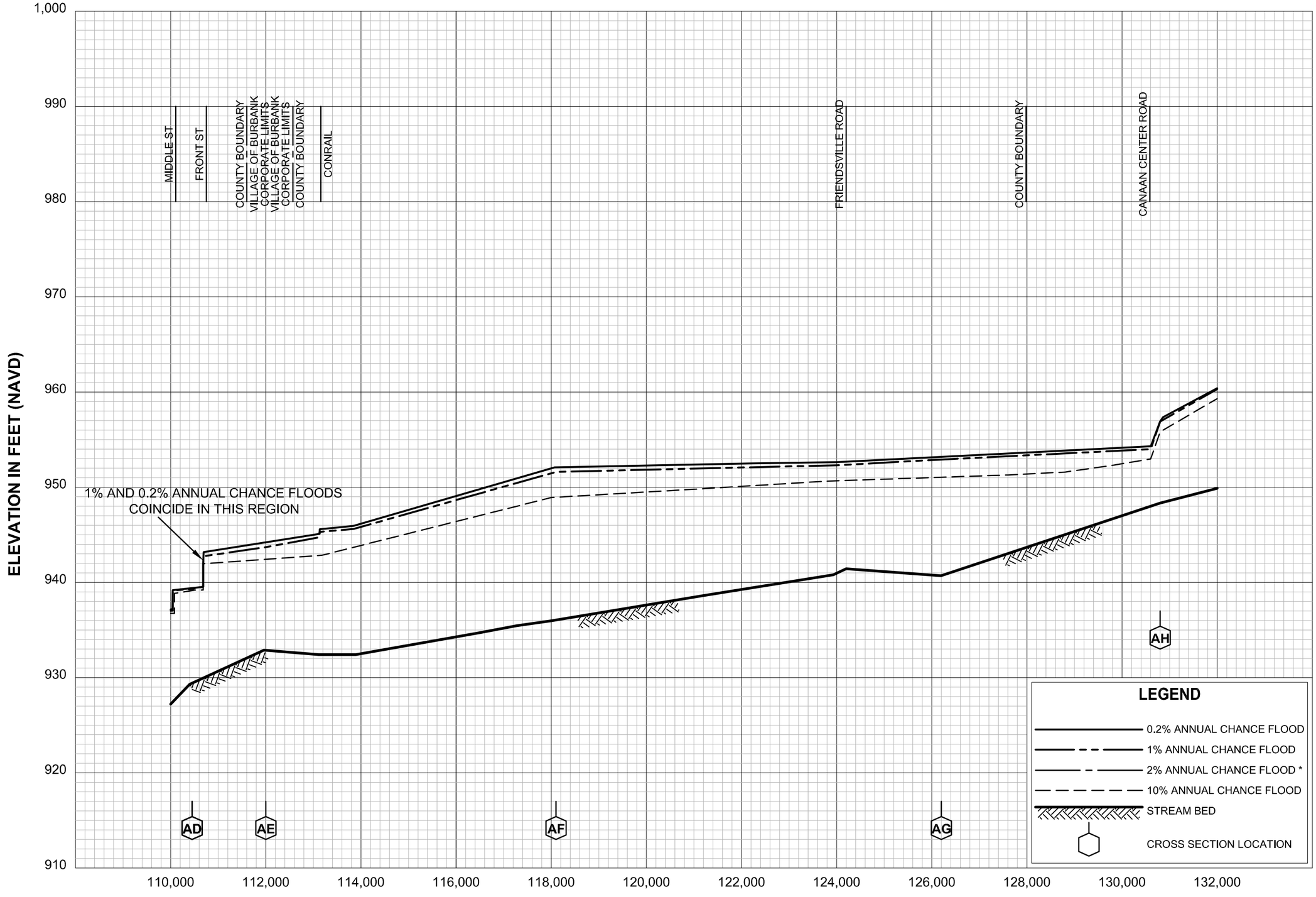
FLOOD PROFILES

KILLBUCK CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAYNE COUNTY, OH

AND INCORPORATED AREAS



FLOOD PROFILES

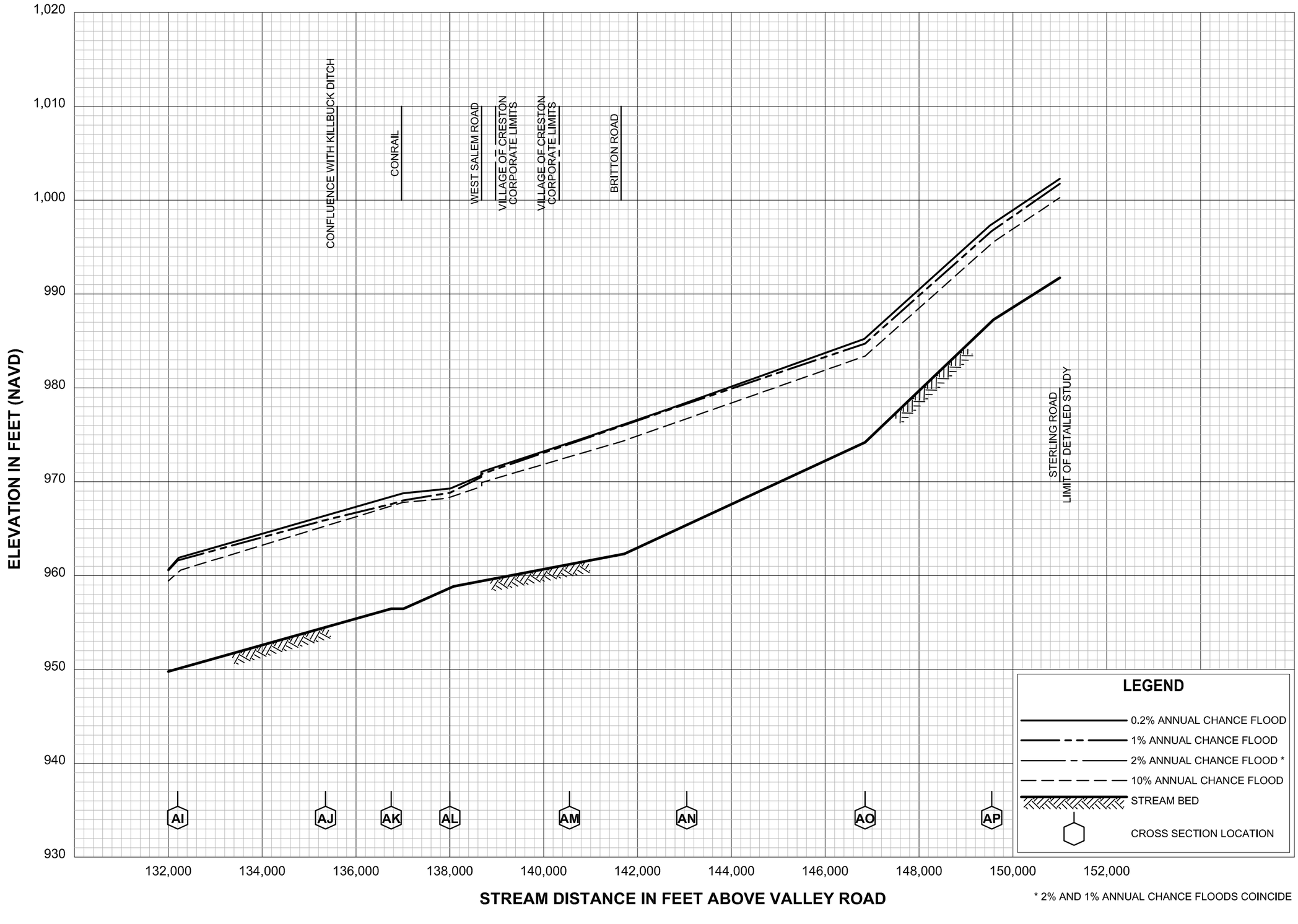
KILLBUCK CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAYNE COUNTY, OH

AND INCORPORATED AREAS

22P



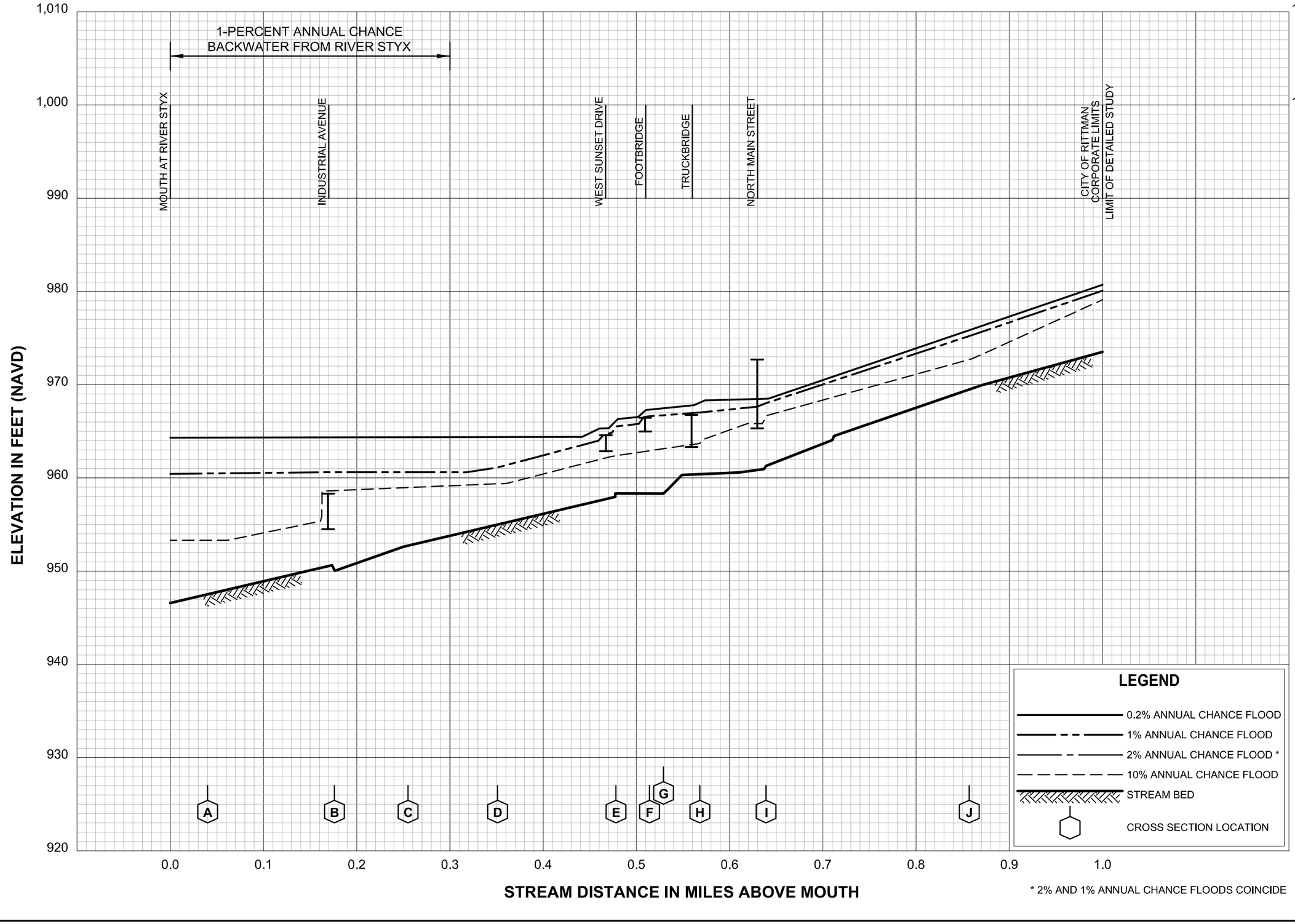
FLOOD PROFILES

KILLBUCK CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAYNE COUNTY, OH

AND INCORPORATED AREAS



FLOOD PROFILES

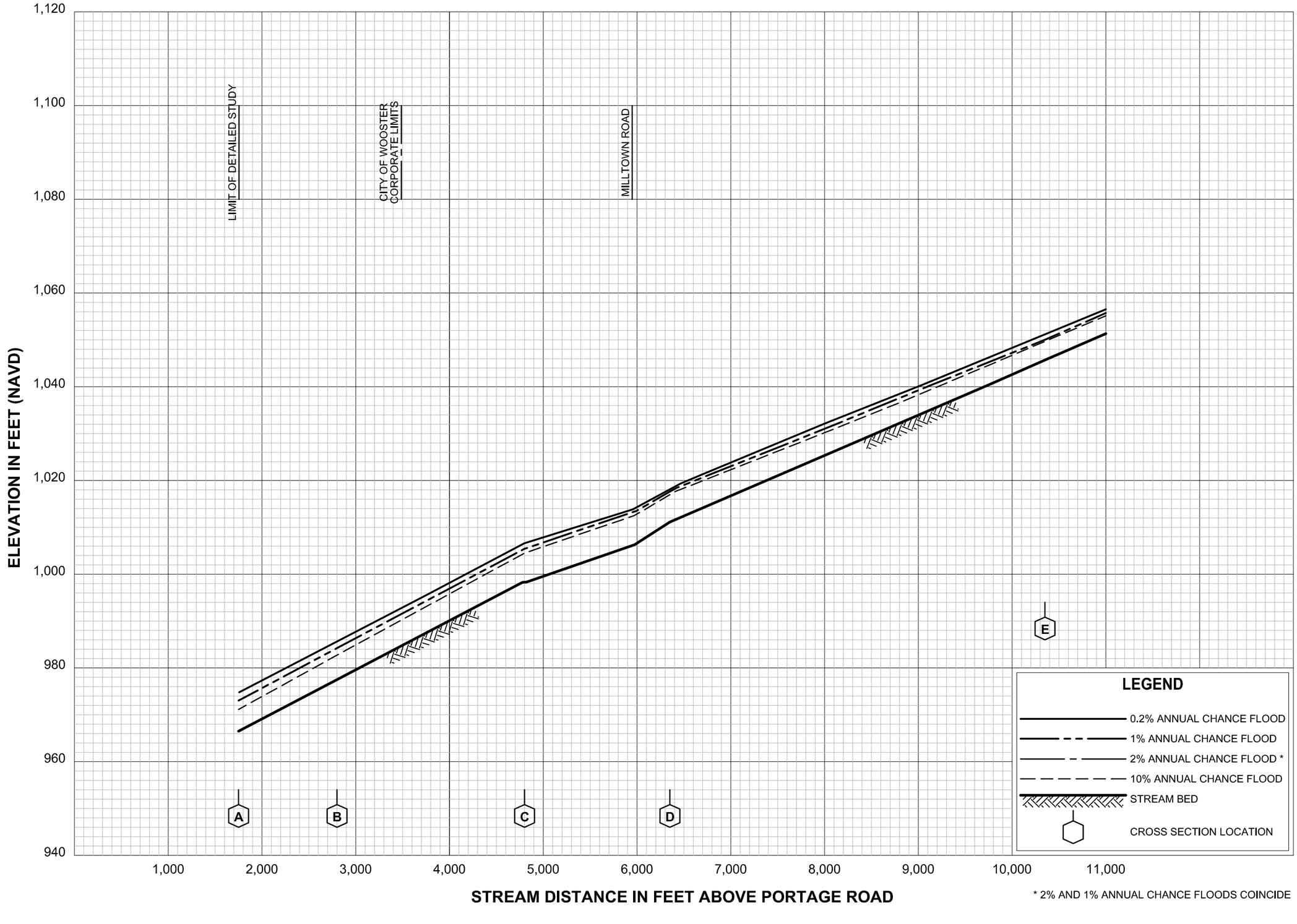
LANDIS DITCH

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAYNE COUNTY, OH

AND INCORPORATED AREAS

24P



FLOOD PROFILES

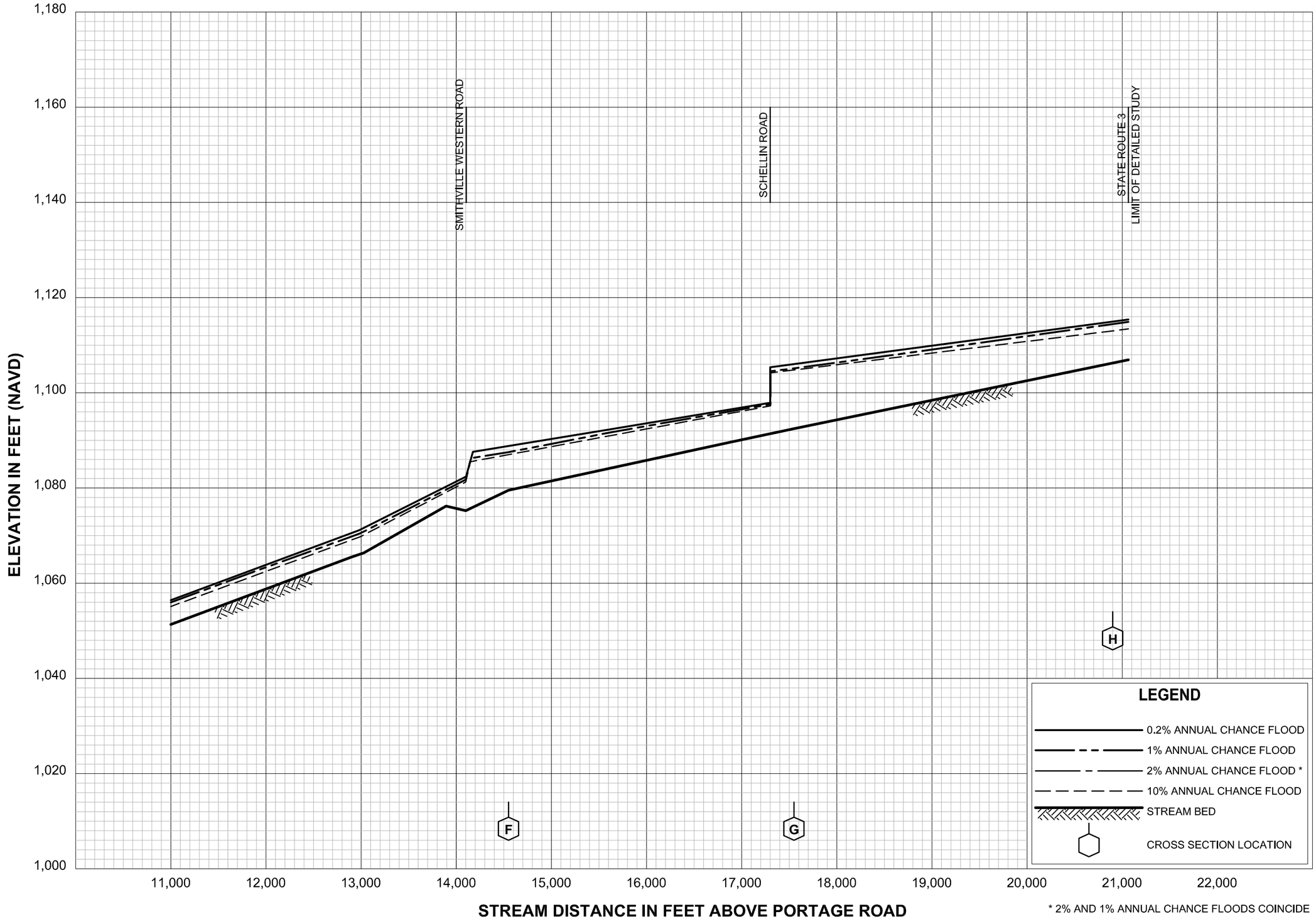
LITTLE APPLE CREEK 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAYNE COUNTY, OH

AND INCORPORATED AREAS

25P



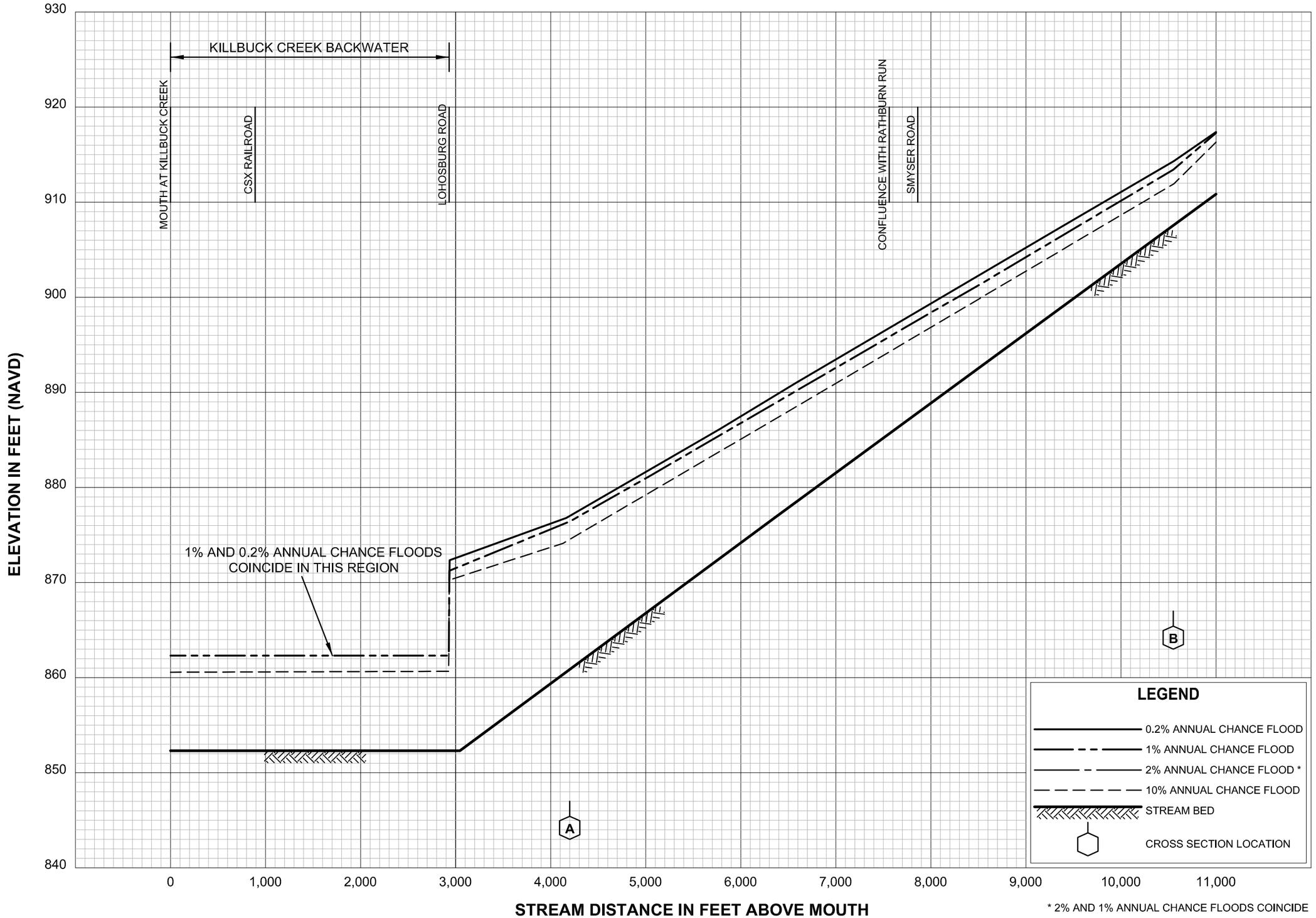
FLOOD PROFILES

LITTLE APPLE CREEK 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAYNE COUNTY, OH

AND INCORPORATED AREAS



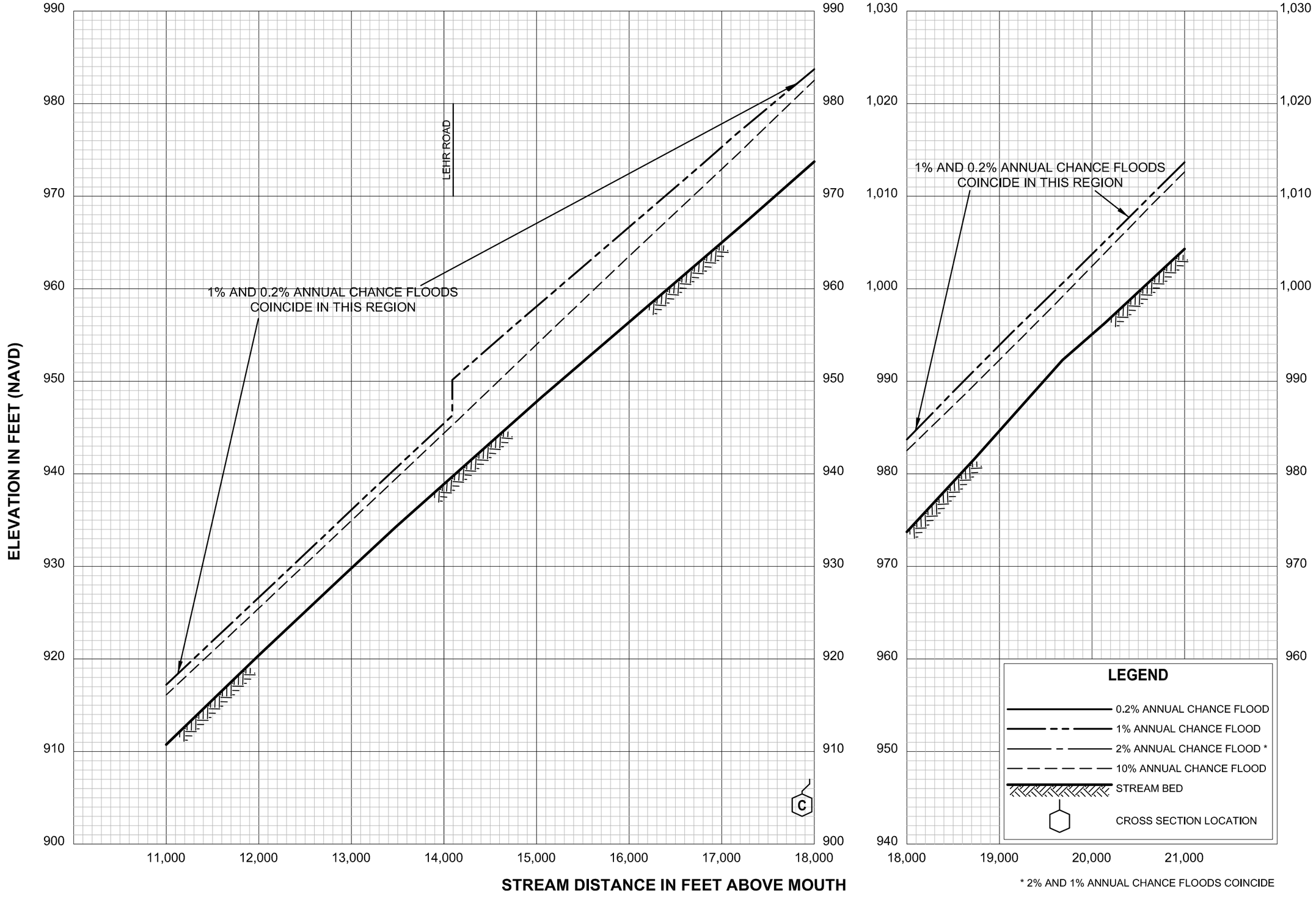
FLOOD PROFILES

LITTLE KILLBUCK CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAYNE COUNTY, OH

AND INCORPORATED AREAS



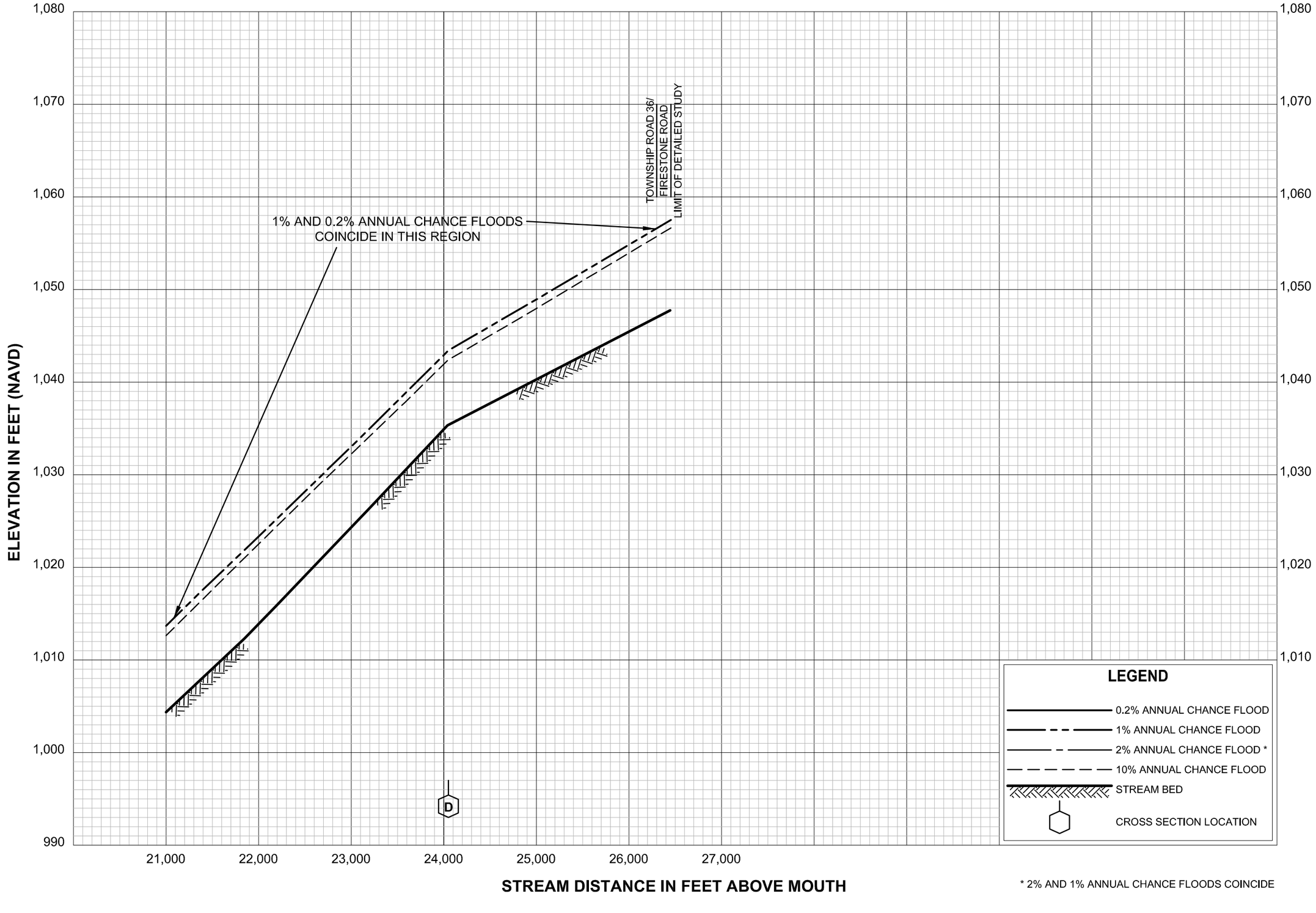
FLOOD PROFILES

LITTLE KILLBUCK CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAYNE COUNTY, OH

AND INCORPORATED AREAS



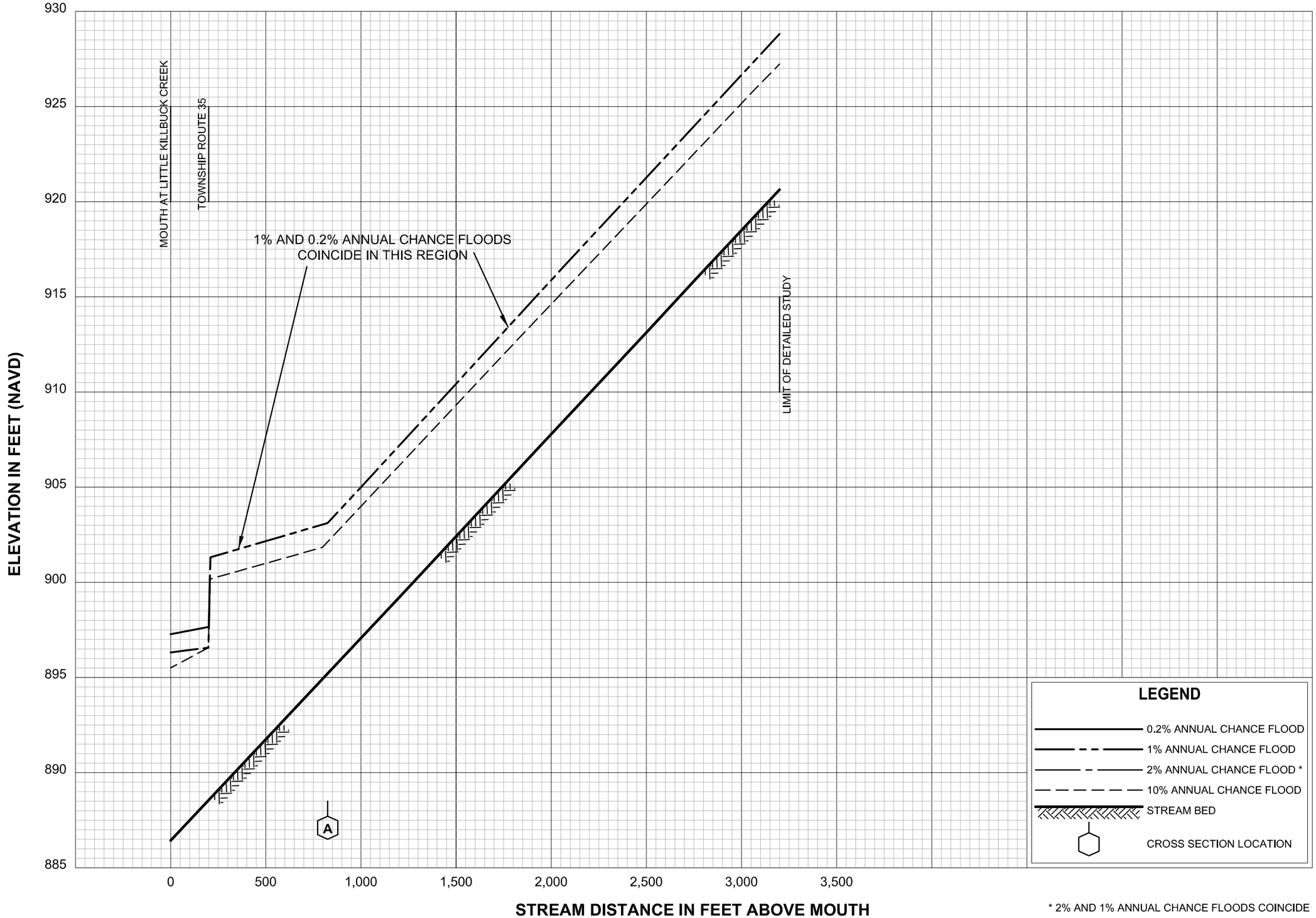
FLOOD PROFILES

LITTLE KILLBUCK CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAYNE COUNTY, OH

AND INCORPORATED AREAS



FLOOD PROFILES

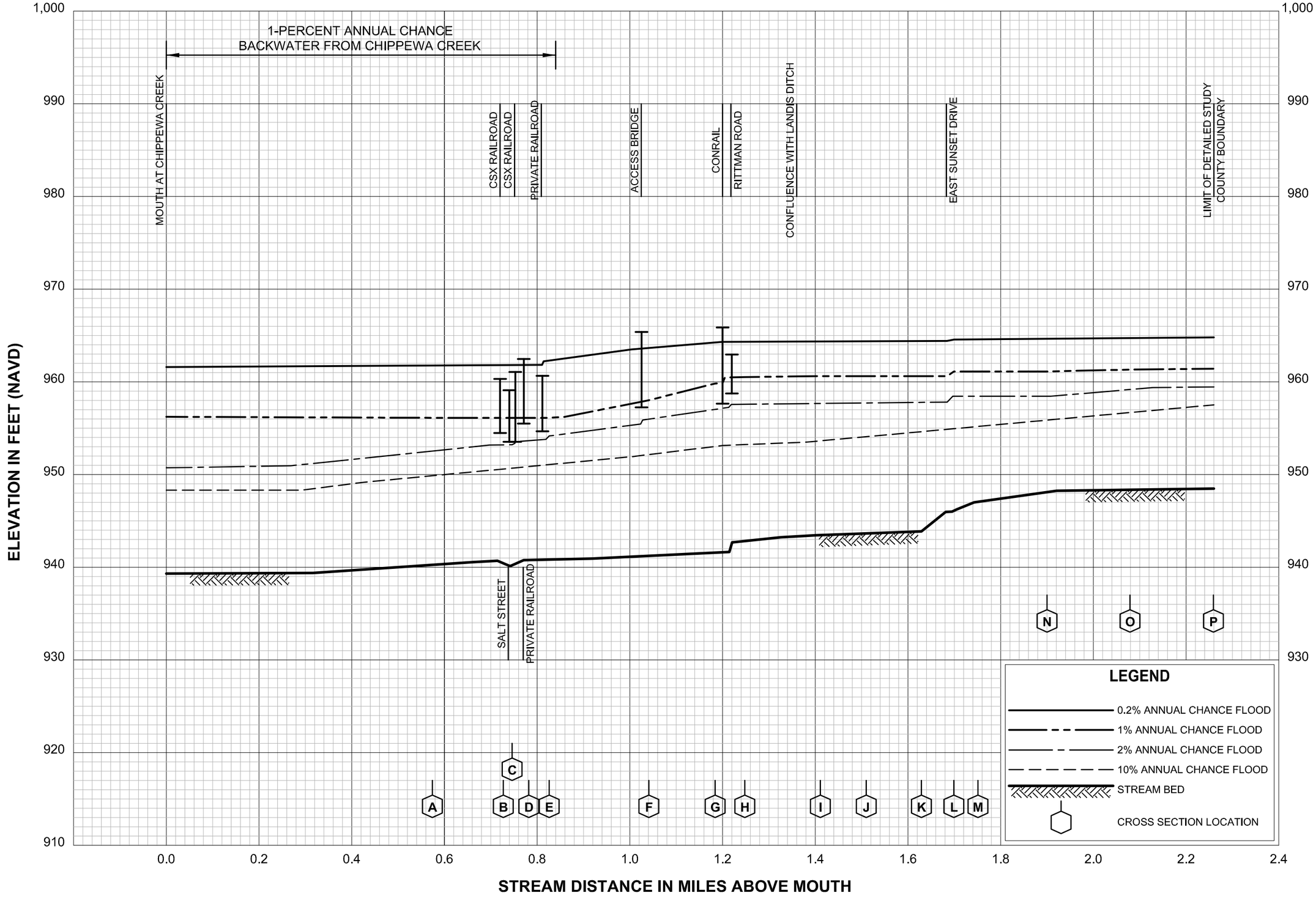
RATHBURN RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAYNE COUNTY, OH

AND INCORPORATED AREAS

30P



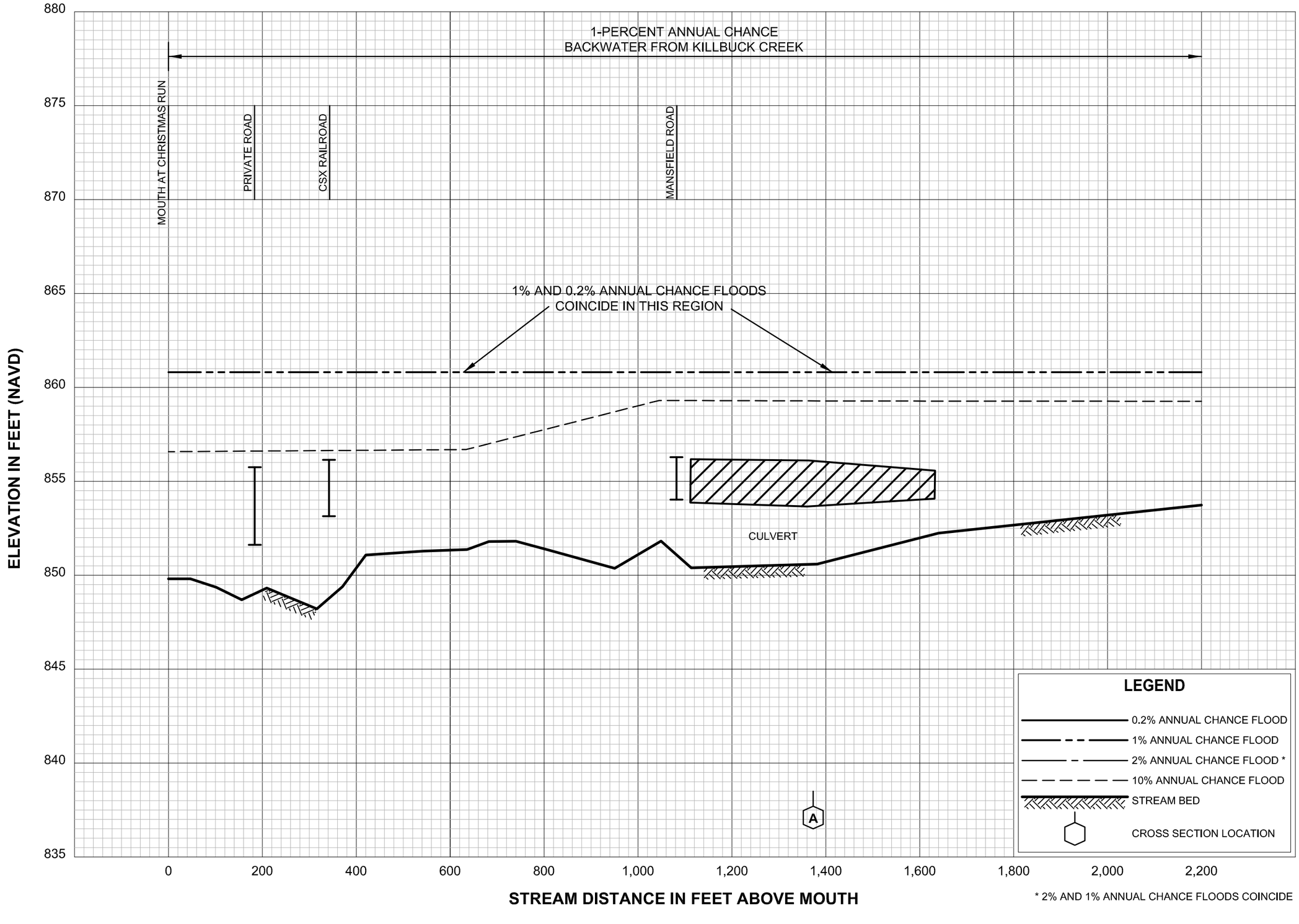
FLOOD PROFILES

RIVER STYX

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAYNE COUNTY, OH

AND INCORPORATED AREAS



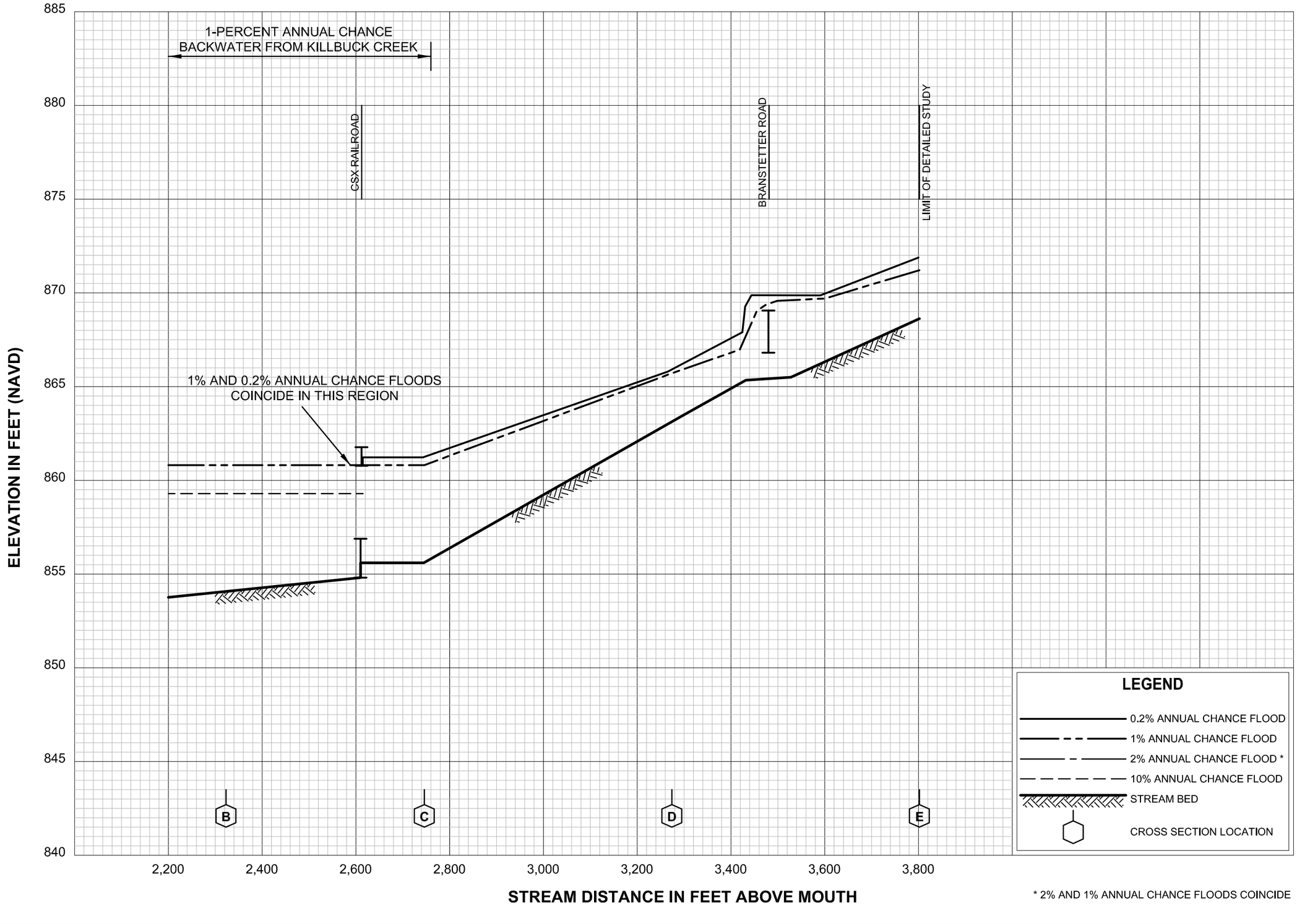
FLOOD PROFILES

SNYDERS DITCH

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAYNE COUNTY, OH

AND INCORPORATED AREAS



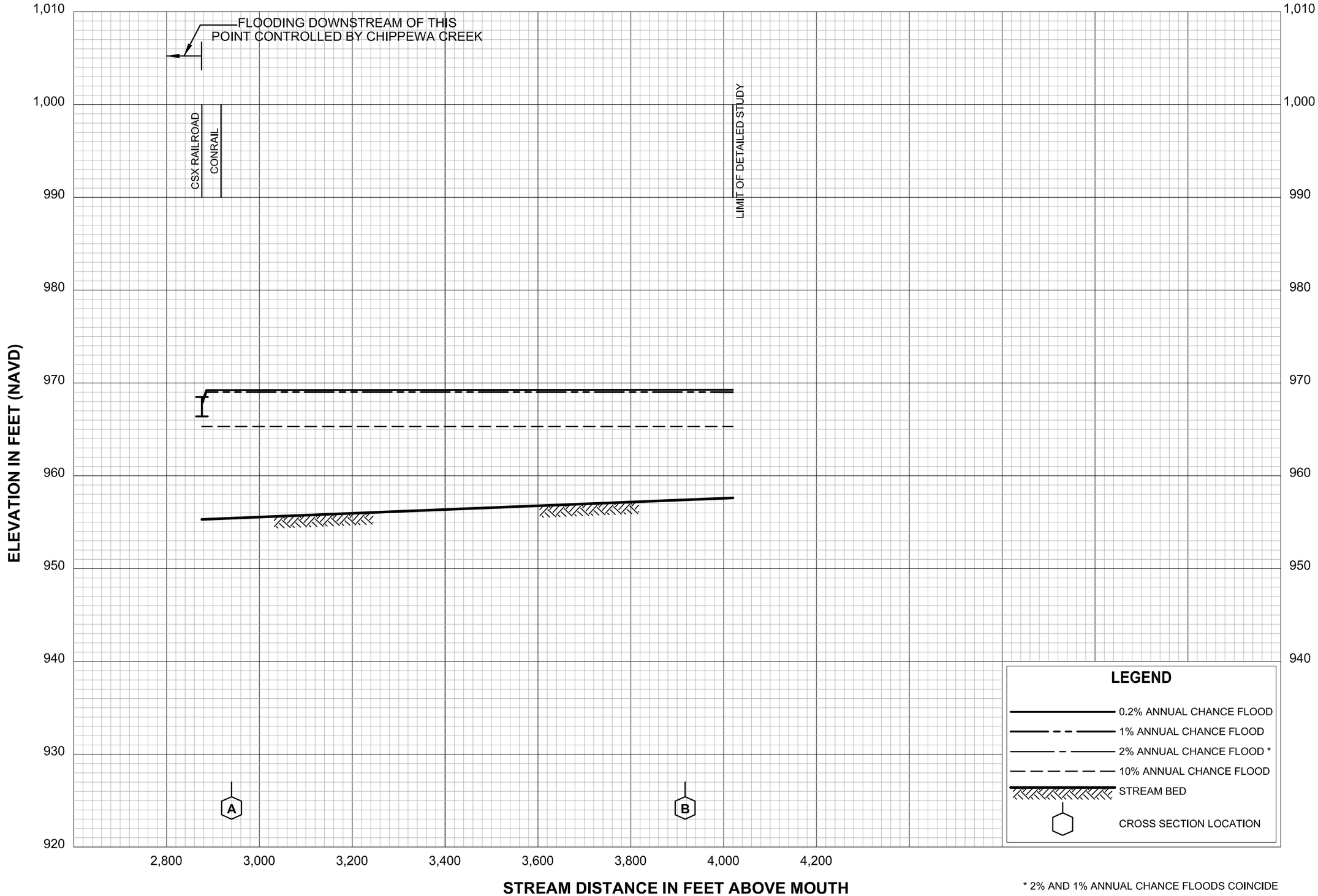
FLOOD PROFILES

SNYDERS DITCH

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAYNE COUNTY, OH

AND INCORPORATED AREAS



FLOOD PROFILES

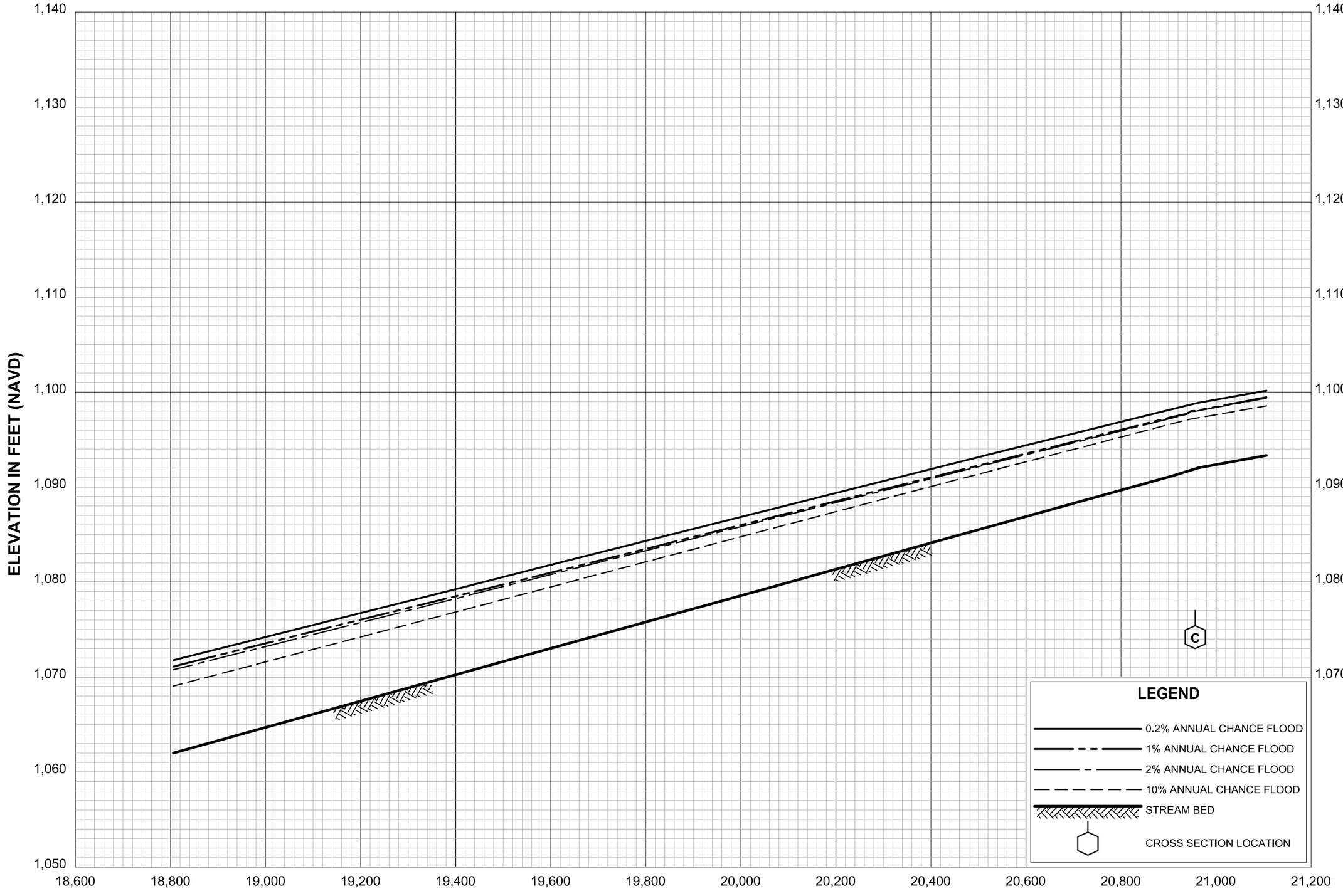
TOMMY RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAYNE COUNTY, OH

AND INCORPORATED AREAS

34P



FLOOD PROFILES

TOMMY RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAYNE COUNTY, OH

AND INCORPORATED AREAS

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